

Book I. The Antiquity

Chapter 2

Astronomical Method in Chronology (Eclipses)

Astronomical method in chronology consists of dating historical documents by certain remarkable astronomical phenomena (e.g. solar eclipses) described in the document. It was initiated by the founders of modern scientific chronology (16th century) and has been repeatedly used by later researchers (till this day).

This method has certain advantages (giving reliable absolute dates in the Julian days), but also many disadvantages. Its uncritical use can (and in fact does) create major errors.

In this chapter, we will apply the astronomical method to the dating of “History of the Peloponnesian War” by Thucydides, outline the theory of this method, discuss its strengths and weaknesses, analyze its application to the dating of ancient and early medieval literary monuments and, on this basis, we will find direct evidence for the apocryphal nature of several ancient literary monuments.

§ 1. Basic facts about eclipses

For the material in this paragraph, see [24].

Lunar eclipses

When the Moon, as it moves around the Earth, enters the cone of the Earth's shadow, a lunar eclipse occurs on the Earth (more precisely, on its nighttime, lunar-facing hemisphere). It lasts about two hours and is only possible during a full moon, but because of irregularities in the moon's movement, it does not occur every full moon. There is a rough, approximate periodicity in the recurrence of lunar eclipses called a saros. The saros period is about 18 years.

There are about 28 eclipses of the Moon during this period, so you can always find at least one lunar eclipse near any date.

Saros is easily detected in 50–60 years of systematic observation. Therefore, we can trust reports that saros was already known at the dawn of astronomy.

And yet prediction of lunar eclipses by saros is not very reliable, not only because of the inaccuracy of saros but also

because the eclipse can occur at the moment when it is daytime at the given point on the Earth's surface and the Moon is not visible.

Solar eclipses

A solar eclipse occurs when the observer is in the cone of the moon's shadow. If the moon completely obscures the solar disk, the Earth becomes dark and the stars become visible. Such an eclipse is called a *total* eclipse. Its duration can reach 8 minutes in the equatorial zone and 6 minutes in the temperate zone.

The shadow of the Moon moves over the Earth at a speed of 110 m/s, drawing a narrow band. The width of this band can reach 4° . The total shadow band (eclipse axis) is flanked by the penumbra band, about 30° wide in one direction from the center of the total shadow band in the middle zone and about 15° wide in the equatorial zone. The observer in the penumbra zone sees the solar disk only partially covered by the Moon. Such an eclipse is called a *partial* eclipse. The maximum extent to which the disk of the Sun is covered by the moon is called the depth of the eclipse,

or its *phase*; the phase is evaluated in φ points, which are calculated according to the formula:

$$\varphi = 12 \lambda$$

where λ is the ratio of the diameter covered by the shadow to the entire diameter. A total eclipse has a phase of 12 points. Starting with a phase of 3–4 points a solar eclipse is detected with the naked eye as a darkening.

The phases of a lunar eclipse are calculated somewhat differently: a variable proportional to the duration of the eclipse is added to the 12-point phase of the total eclipse. As a result, the phase of the lunar eclipse can reach 22.7 points.

There are cases when the cone of the total shadow of the Moon does not reach the Earth. In such a case, the so-called *ringlike eclipse*(annular eclipse) of the Sun is possible. During the ringlike eclipse, just like any partial eclipse, the stars are not visible.

A solar eclipse is possible only during a new moon. However, not every new moon is accompanied by a solar eclipse because due to the tilt of the lunar orbit to the ecliptic (plane of the Earth's orbit), the Earth can slip past the cone of

the lunar shadow. Therefore, there are only 2 to 7 solar eclipses on Earth each year. Each locality on Earth receives an average of 1 solar eclipse with a phase of at least 6 during 10 to 20 years before or after any date.

Prediction of eclipses

Prediction of solar eclipses is very difficult due to the complexity of the Moon's motion, which, in addition to the Sun and Earth, is affected by the gravity of other planets (say, Jupiter). It is possible to try to predict eclipses from the saros, during which there are about 43 eclipses of the Sun (15 partial, 14 ringlike, 2 so-called ring-total(hybrid), and 12 total). However, these eclipses, separated by the saros, occur, generally speaking, in different regions of the Earth, and therefore, the prediction for a given location is justified on average in 1 case out of 400 (i.e. the probability of a correct prediction is $1/400$) (see [4]. p. 415).

Theoretically, the best results should be given by the so-called *triple saros* of 54 years. However, the probability of predictions with it is only $1/99$, and therefore, it is also inapplicable in practice. Additionally, empirically the triple

saros can be detected only from observations of solar eclipses. Due to its relative duration and small repeatability of solar eclipses separated by the triple saros, this detection requires such long and systematic observations (not to mention the difficulties of their mathematical processing necessary to detect its previously unknown periodicity) that we cannot seriously speak of its possible use in the Antiquity. More or less reliable prediction of solar eclipses is possible only on the basis of sufficiently advanced theory of the lunar motion, considering at least its basic inequalities. Therefore, it is not surprising that even 100 years after Copernicus, solar eclipses weren't actually being predicted yet. Consequently, **we should be really skeptical of any reports of solar eclipses predicted before the New Time. Almost certainly such reports are either pure fantasies aimed at wishful thinking or they are later apocrypha.**

This consideration is critical and we draw the reader's special attention to it.

Calculation of eclipses

"Astronomical accuracy" has long been commonplace. Perhaps this is why many people do not fully understand the fact that the basic astronomical constants are taken from observations and therefore are known with some error only. The computational formulas of astronomy are obtained from an infinite series of digits by discarding all digits after a particular one, and therefore also introduce systematic errors. Finally, the calculations themselves are carried out only with a certain accuracy, introducing the so-called rounding error; in calculations for long time intervals the error increase, and therefore, say, an eclipse a thousand years ago (or in the future) even in theory cannot be calculated (predicted) with the same (second-wise) accuracy as eclipses close to us in time. Not to mention that there are conceivable sources of errors whose existence we can only suspect and which even in theory can't be considered (slowdown of the Earth's rotation about a process of which in ancient times we cannot say anything without falling into a vicious circle; deviations of gravitational interaction from Newton's law, etc., etc.).

Thus, estimating in advance the magnitude of the error being made is theoretically impossible. Therefore, astronomers must make so-called "empirical corrections" to their formulas, comparing calculated events to actually occurring ones. This situation is described perfectly by prof. A.A. Mikhailov:

"Of particular importance are the extant data on the observation of eclipses in antiquity. The simple indication that a particular eclipse was observed as total in a certain location makes it possible to determine the position of the Moon with an accuracy far superior to the observations made before the vision pipe was applied for measurement. The observation of lunar eclipses, although with lesser accuracy, still, if accompanied by even a rough indication of the hour of the night when the eclipse was visible, allows for the position of the Moon to be determined. Therefore, *the extant historical observations of eclipses appear the main and the most accurate source for determining the position of the Moon and Sun in times long past*, which is of great importance for determining certain constants in the motion of the Moon and Sun and, first of all, the centennial acceleration of the Moon, concerning the

magnitude and origin of which there has been much controversy" ([24], pp. 28–29).

We will return to this matter (the acceleration of the Moon in particular), but so far we will just point out that to avoid a vicious circle, clarification of astronomical constants needs eclipses reliably dated with non-astronomical methods. It is necessary to know the date of the eclipse in the Julian days and preferably the time of day. Because of the confusion and vagueness of ancient calendars, this is only possible for relatively late, medieval eclipses. It is not without reason that the earliest eclipse that Ginzler used for his corrections of the Oppolzer Canon (see below. § 3) dates back to 590 A.D.

Let us now consider with a concrete example how eclipses are used to date historical events.

§ 2. "History of the Peloponnesian War"

by Thucydides

Thucydides and his book

"Greek historiography, started by Herodotus, reaches the pinnacle of scientific and artistic expression in Thucydides' work on the history of the Peloponnesian War, of which the author himself was an eyewitness and participant" ([14], p.168).

We are told that Thucydides (which, according to Morozov, in Greek means "censer giver," i.e. something like a sexton; see [4], p.469), son of Olorus, was born about 460 B.C. and died in 396 B.C. He was a wealthy Athenian aristocrat and statesman. During the war, as a strategist, Thucydides unsuccessfully commanded the Athenian fleet off the coast of Thrace (northern Greece) and was expelled from Athens for 20 years. While living in Thrace, he wrote his work. Before the end of the war, Thucydides was granted amnesty and returned to Athens. He died shortly after that.

The historical tradition fully trusts Thucydides in describing the events of the war as an eyewitness and participant. Thucydides himself writes that he "also described these events in the order in which they occurred by summer and winter... I experienced all war, thanks to my age I understood it and observed it closely to know the individual events precisely" (Thucydides, V, 26; see [9], vol. 2, p.20-21).

Thucydides is our **only** source for the history of the Peloponnesian War: "After Thucydides... nobody was turning to the history of the Peloponnesian War anymore. However, many considered it flattering to act as his followers and continuators, starting their works where Thucydides' work broke off" ([14], p. 171). Among these followers are, for example, Xenophon, Theopompus, and Aephorus.

In this day, Thucydides' work is divided into eight books; however, this division does not belong to the author. The true division of the narrative in the original was by summer and winter.

In the Greek originals, Thucydides' book is called "Joint Description" ("Sunegrafae"), but in translations, the title "History of the Peloponnesian War" is accepted.

Thucydides' account of the 27-year war between the "Ionians" and "Dorians" over the hegemony is absolutely clear and coherent, although it does not last until the end of the war. For example, here is a summary by F. G. Mischenko (translator of Thucydides) of the events of the first year of the war, which he made based on book II of Thucydides' works (see [9], vol. 1, p. 181):

"The first summer of the war: the attack of the Thebans on Plataea (1–6). Armament of the Lacedæmonians and Athenians, allies of both (7–9). The first invasion of Attica by the Lacedæmonians: Assemblies of the Lacedæmonians, Archidamus' speech (10–12). Athenian measures to repel the enemy; the author's digression on the ancient state of Attica (13–17). Stay of the Lacedæmonians in Attica (18–22). The departure of the Athenian fleet to Peloponnesian waters and the retreat of the Lacedæmonians from Attica (23). Athenian defensive actions (24). Military actions of the Athenians, their making of an alliance with Sitalca, the Athenian invasion of

Megaris, and the strengthening of Atalanta (25–32). Winter. Military operations of the Corinthians (33). The state funeral of the Athenians fallen in the war, Pericles' eulogy (34–46).

The following years are described in equal detail and consistency.

The detail of the account makes it possible to reconstruct a map of the military campaigns of allies (see the map in [15], pp.192-193). The entire theater of military operations is located in the eastern part of the Mediterranean and does not extend above 41° N; the Bosphorus strait and the South of Crete did not belong to the active theater, but many battles occurred on Asia's coast. Thus, all the events described by the Thucydides are clearly localized in a quite small geographical square of the eastern Mediterranean.

Thucydides' authenticity

Thucydides starts his work in the following beautiful manner (translation by F.G. Mishchenko): "Thucydides, an Athenian, wrote the history of the war between the Peloponnesians and the Athenians, as they waged it against each other. He began his work immediately after the

outbreak of the war because he was convinced that it would be important and more interesting than all previous ones. He so concluded from the fact that both sides had all the arrangements for this war in the best condition, and also from the fact that the other splines, as he saw them, were adjoining one side and the other; some immediately, others were intending to join afterward. Indeed, the event was a great shock to the Hellenes, to some barbarians, and, one might even say, to the great majority of all nations. What preceded it shortly before and what occurred even before that, has been impossible, for the time passed, to examine accurately, but on the basis of the evidence by which I have managed to penetrate with authenticity into the possible distant past, I believe that nothing of military importance happened then, for it appears that the country now called Hellas has been inhabited by permanent inhabitants only lately, for previously there have been migrations, and every nation was leaving its land easily, being pushed out by other inhabitants, in great numbers each time" (Thucydides, 1, 1-2; see. [9], v.1, pp.35-36).

This style is maintained during all 880 pages of Thucydides' work. Clearly, **it is impossible to achieve such a**

style without numerous drafts. How much precious parchment (and papyrus) did Thucydides (in exile) need to write his book?

Further reading of Thucydides' work reveals the following features:

1) the author demonstrates tremendous previous experience in reading and writing;

2) the constructions of phrases are very complex and equipped with non-trivial grammatical structures;

3) there is a clear development of a coherent realistic idea in the presentation of historical facts;

4) there is a skeptical attitude to everything supernatural in human life.

As we have already found (see § 5, Ch. 1), the first three features are inherent in the books of the era of paper and printing and could not develop in pre-paper time of few and grammatically non-uniform manuscripts. Thucydides' freethinking (n.4) also definitely points to the Renaissance.

This is enough already to accuse Thucydides' book of being apocryphal. Let us, therefore, see what evidence there is for Thucydides' authenticity.

Say, do manuscripts of the Thucydides' work provide such evidence?

As for the parchment manuscripts (codices), the most ancient of them is considered a manuscript preserved in Florence and dating back to the 11th century. The manuscripts preserved in the libraries of the Vatican, Heidelberg, London, Munich, and Paris are of somewhat later date. All these manuscripts differ only slightly from each other.

Consequently, even if we believe these dates, it turns out that the available manuscripts of the *Synegrafae* only allow us to conclude that this work was written no later than the 11th century A.D. However, we have already noted that paleographic dating is highly unreliable since nothing prevents a skilled scribe from producing a manuscript in any handwriting; therefore, even the 11th-century dating we can only accept with caution.

The papyrus fragments of book II of Thucydides' "History..." and comments on it, found at Oxyrhynchus, are thought to be older than the codices. But their dating is even less reliable, and the fact that the material for these fragments is papyrus says nothing because in Egypt papyrus was replacing paper even after the invention of printing.

Thus, **the manuscripts tell us nothing about the antiquity of Thucydides' work**, and therefore, the question of its authenticity (or apocryphality) should be resolved in another way.

Attention has long been drawn to the presence of descriptions of two solar and one lunar eclipse in Thucydides' text. Let's see if these descriptions allow us to reliably date the events described by Thucydides and thus resolve the question of the authenticity of the Sunegraphae.

Eclipses in Thucydides

In the book I of Thucydides' works, there is a mention of eclipses of the Sun, but it is very general and vague. Although it cannot serve for astronomical dating, we give the text to complete the picture:

"...the last war dragged on for long, and during it, Hellas experienced as many calamities as it had never experienced in an equal interval of time. Indeed, never had so many cities been taken and ruined, partly by barbarians, partly by the belligerents themselves, and in some cities, the population changed after their conquest; never had so many expulsions and deaths, partly in the war itself, partly in internecine strife. What is told of the past by hearsay and is seldom confirmed in reality has now become certain: earthquakes, which at once overwhelmed a vast part of the earth with terrible force, solar eclipses, which occurred more often than it is reported about former times, then droughts, and, as their consequences, severe famine, and finally, plague, which caused the greatest misery and also destroyed plenty of people. Indeed, all this fell at the same time as the last war. It was started by the Athenians and Peloponnesians who broke the thirty-year

peace made after the conquest of Euboea" (Thucydides, 1:23; see [9], vol. 1, pp.51-52).

On the opposite, in Book II, the solar eclipse is described in some detail:

"That same summer the Athenians expelled the Aeginae with their wives and children, considering them the main culprits of the war; besides, they found it safer for themselves if Aegina, lying near Peloponnesus, would be occupied by their citizens. A little while later, they sent their colonists to Aegina. The Lacedemonians gave the Aegina expellees Phyreus to live in and put its fields at their disposal, partly because of their enmity toward the Athenians, partly because of the service they had received from the Aeginae during the earthquake and the Gelotian uprising. The province of Therae lies on the border of Argopis and Laconica and extends to the sea. Some of the Aeginians settled here, while others were dispersed in the rest of Hellas.

That same summer, on a new moon, - seems like it is the only time when it is possible. - The sun was darkened in the afternoon, took a shape of a half-moon, moreover, some stars were visible,

and then it became full again" (Thucydides, II, 27–28; see [9], vol.1, p.202).

Pay attention that the author understands the eclipse mechanism well, mentioning the necessity of a new moon (in any case, this is an indication of a longstanding practice to observe eclipses in ancient times).

Another solar eclipse is described in Book IV in the following terms:

"In the same winter, the Chiosians also tore down their new fortification at the demand of the Athenians, who suspected them of striving for some coup; but they concluded a treaty with the Athenians, securing as far as possible the inviolability of their institutions on the part of the Athenians. At the same time, the winter and the seventh year came to an end during this war, the history of which Thucydides wrote.

At the beginning of next summer under a new moon, there was a partial solar eclipse and at the beginning of the same month, there was an earthquake" (Thucydides, IV, 51–52; see [9], vol. 1, p.428).

Apparently, the summer month mentioned in the text (the beginning of the summer campaign) is March, the usual month of the beginning of summer campaigns (it is not without reason that "March" means "month of Mars"). This observation will be interesting to check in research of the final solution of these tasks!

Book VII states:

"Winter was coming to an end, and the 18th year of the war, the history of which the Thucydides wrote, was also coming to an end.

As soon as the following spring began, the Lacedemonians and Allies invaded Attica at a very early time... (Thucydides, VII, 18; see [9], p.219).

Further, paragraphs 20–49 detail the summer events. A study of the length of all military movements shows that the following paragraphs 50–51 already describe the end of summer:

"...From here they crossed over to Selinunte. Immediately upon their arrival, the Syracusans began to prepare for a new attack on the Athenians by sea and land

forces. On the opposite, the Athenian generals, seeing that the new army had arrived for the enemies and that their own affairs were not getting better but were getting worse every day in every respect, especially because of the illness of the people, repented for not leaving earlier: Nicias himself no longer resisted with the same tenacity and only wished that this decision had not been made public. So the commanders gave the order to get everyone ready with a signal to sail from the anchorage (in Sicily - Auth.). When everything was ready and the Athenians were about to set sail, *there was a lunar eclipse; it was then a full moon*. Most of the Athenians, confused by this, demanded of the commanders to wait with the sailing, and Nicias, giving too much importance to omens and all such, assured that it was out of the question to move out any earlier than after three times nine days: so the diviners instructed. As a consequence, there was a delay and Athenians stayed." (Thucydides, VII, 50–51; see [9], vol. 2, p.247-248).

Let us summarize. Six following statements unambiguously emerge from the text:

1) In the eastern quadrant of the Mediterranean basin, extending in latitude from about 15° to 30° and in longitude from 30° to 45° , Thucydides recorded a triad of eclipses: I (solar), II (solar), III (lunar) with intervals of 7 and 11 years between them:

2) eclipse I occurs in summer;

3) eclipse I is total (stars are visible);

4) eclipse I occurs in the afternoon (local time);

5) eclipse II occurs in early summer;

6) eclipse III (lunar) occurs in late summer.

Additionally, there are indications in the text that eclipse II occurs in March, but we will include this condition in the list of explicit requirements 1–6. The problem is to find a triad satisfying basic conditions 1–6.

Regular dating

In the 16th century, Petavius picked for this eclipse a date of August 3, -430. J. Kepler (16th century) confirmed that there was indeed an eclipse on that date. Ever since, we know the date of the beginning of the Peloponnesian War: -430.

For eclipse II, Petavius picked the date of March 21, -423.

For eclipse III, Petavius picked the date of August 27, -412.

Thus, it seems that astronomy provides a clear dating of the described events in the V century BC. However, let's inspect the triad found by Petavius (-430, -423, -412) more carefully (and in reverse – tr).

For this triad, the intervals between eclipses are equal to the required 7 and 11 years.

The lunar eclipse of -412 had a phase of 13.2 and was visible in Europe. Its point of zenith visibility had coordinates of $+44^{\circ}$ longitude and -18° latitude, i.e. was in the north of Madagascar. This eclipse satisfies all the conditions imposed on eclipse III.

The solar eclipse of -423 is ringlike (see [16], p. 178). It occurred at sunrise, in the morning in the Atlantic Ocean, before noon in Ireland and Sweden, and then the band of maximum phase went to the North Pole. According to Ginzel (see [16], p.59) its phase was 8.4 in Athens and 9.4 in Rome. This eclipse satisfies all the conditions imposed on eclipse II.

After Petavius, the -430 solar eclipse has been studied by many authors (Zechs, Heis, Stroeck, Kepler, Riccioli, Hoffmann, Ginzel, Johnson, Lynn, Stoeckel, Zeifarth). So much attention was paid to this eclipse because its phase was challenging. According to Petavius, the phase of this eclipse in Athens was 10.25, and according to Stroeck, it was 11; only Kepler claimed that the phase of this eclipse was 12, i.e., that this eclipse was total. Further research, using refined data on the movement of the moon, yielded the following results for the phase of this eclipse at Athens:

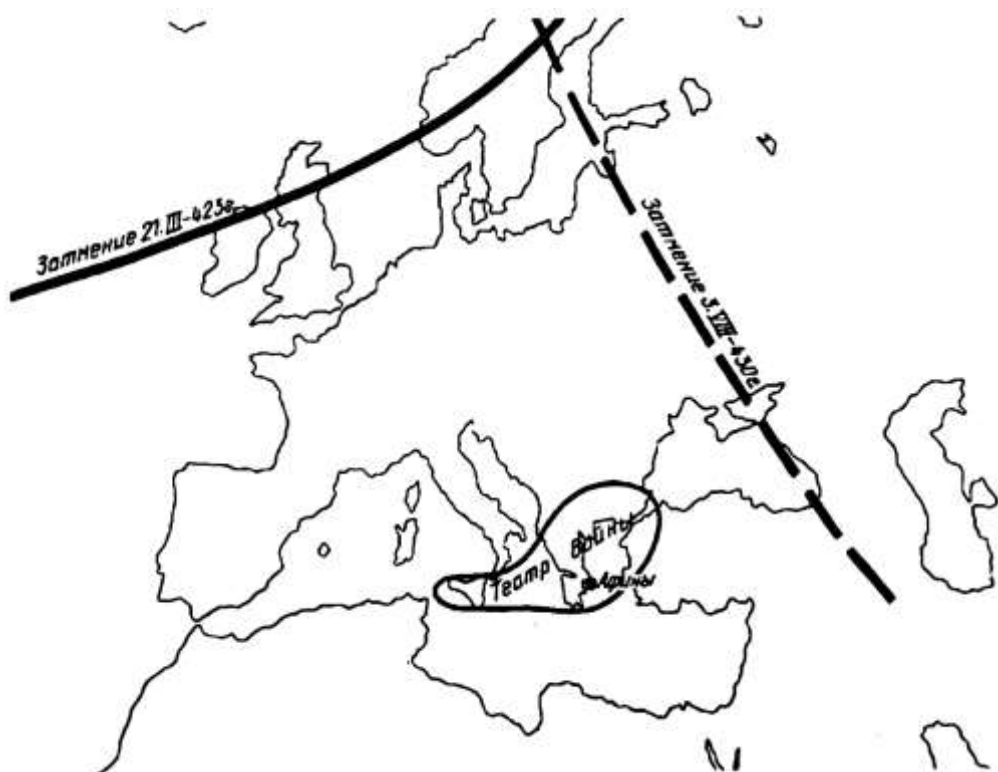
Zech - 10.38 points

Hoffman - 10.72 points

Heis - 7.9 points

In this day, the phase of 10 points calculated by Ginzell is accepted (see [16] p.176-177).

In any case, all authorities now agree that **this eclipse was partial**. Moreover, according to Ginzell's calculations, this eclipse was ringlike and therefore was not total anywhere on Earth. It passed the Bering Strait in the morning, the North Pole at noon, Sweden in the evening, then the Crimea, and ended in Mesopotamia at sunset. All this is clearly visible on the map.



Eclipse of 21.III-423. Eclipse of 3.VIII-430. Theater of the war. Athens.

Since the eclipse of August 3, -430 was not total, **no stars could be seen anywhere on Earth** at the moment of the eclipse. A 10-point phase in Athens (and a 9.4-point phase in Rome) means that 1/6th of the solar disk was open, which gives a clear day without visible stars.

Moreover, this eclipse passed Crimea only at 17h22min local time, and according to Heis, even at 17h54min. Therefore, it can be considered "an afternoon eclipse," as it is stated clearly in the text, only by a great stretch. This is the evening eclipse.

Thus, the eclipse of -430 indicated by Petavius **cannot be the Thucydides eclipse** because it does not satisfy conditions 3 and 4.

The discovery of this circumstance was very unpleasant for traditional chronologists. Ginzel writes on this subject, "The insignificance of the phase of the eclipse, which according to new calculations turned out to be 10 ϕ for Athens, caused some shock and doubt that "the stars were visible" as Thucydides claims..." ([16], p.176). Zech tried to "explain" this circumstance with references to the "clear skies of Athens" and the "great eyesight of the ancients" (!?). Since

no stars were obviously visible, Heis and Lynn decided to calculate the location of the bright planets in the hope that maybe this would save the situation. However, it turned out that Mars was to the right of the Sun at only 3° above the horizon, in a straight line with the Sun and Venus, which was 30° above the horizon. Of Venus, Ginzel is very careful to express that "perhaps it was visible," but with a "clear day" this is unlikely, so all hopes were pinned on Jupiter and Saturn. However, it turned out that Jupiter was in the Gemini below the horizon and Saturn was in the constellation of Pisces, also below the horizon.

In this situation, Johnson suggested another eclipse, that occurred on March 30, -432, but this eclipse wasn't in any triad (nearest triads: -446, -440, -429, and -411, -454, -393: they also do not fit any other considerations) and its phase was only 7.8 points (see [16], p.177).

Then, Stockwell tried revising the phase calculations to find a way to increase it; however, despite all his corrections, he managed to get a phase of only 11.06 points, which is still completely unsatisfactory. Ginzel, however, was very skeptical of Stockwell's calculations.

Seyfarth suggested that perhaps Thucydides' text refers to the eclipse of January 27, -429. However, not to mention the fact that this eclipse does not fit the description at all (for example, it isn't in any triad), it turned out that it was not visible near Athens at all.

The Gordian knot of the problem was "cut" by Hoffmann, who suggested that Thucydides' stars are rhetorical embellishments (?!). Hoffmann relies on the fact that Thucydides allegedly reports the appearance of stars at a time when the Sun was still crescent-shaped.

And, in fact, Thucydides, when he is reporting four events:

- a) The Sun darkened,
- b) the Sun took the form of a crescent,
- c) the stars appeared,
- d) the Sun was replenished again,

uses grammatical structures, from which it only follows that "a" was before "b" and "c"; and "b" and "c" was before "d" but a temporal sequence of events "b" and "c" cannot be

judged. In Mishchenko's translation, this point is somewhat blurry, but for example, in the English translation by Jowett, the temporal independence of events "b" and "c" is reflected clearly. Thus, Hoffmann's opinion (also shared by the contemporary scholar Robert Newton) is based not on Thucydides' text, but on the desire to save traditional dating at all costs.

In spite of all this, the date of Petavius has not been changed, and in any textbook, one can find the beginning of the Peloponnesian War in -430, although there is no basis for this, except for Petavius' definition.

Morozov's dating

The detail and thoroughness of Thucydides' text make any attempts to correct the matter by changing the text unserious (besides Hoffmann's "solution," it was proposed, for example, to revise the duration of intervals between eclipses; but even the authors of this proposal refused to elaborate on it).

Morozov ([4], pp.499-512) decided to check whether triads satisfying conditions 1–6 exist at all and if they do, how many of them are there. This check from the available eclipse tables showed that:

1) there is a triad (I, II, III) that fully satisfies all conditions 1–6,

2) in the interval from year -900 to year +1600 there is only one such triad.

This triad is as follows: August 2, +1133; March 20, +1140; August 28, +1151, i.e., **the 12th century A.D.**

Eclipse I (2.VIII 1133). The streak of the total eclipse begins in the morning on the south coast of Hudson Bay, crosses England before noon, Germany at noon, Austria, Bosphorus, and Mesopotamia in the afternoon, and stops in the Indian Ocean at sunset. Jupiter is in Aries above the horizon; Saturn is in Sagittarius above the horizon; in addition, Venus and Mercury may have been visible. Of the stars, Regulus, Deneb, Colossus, Arcturus, and the constellation of the Big Dipper were visible.

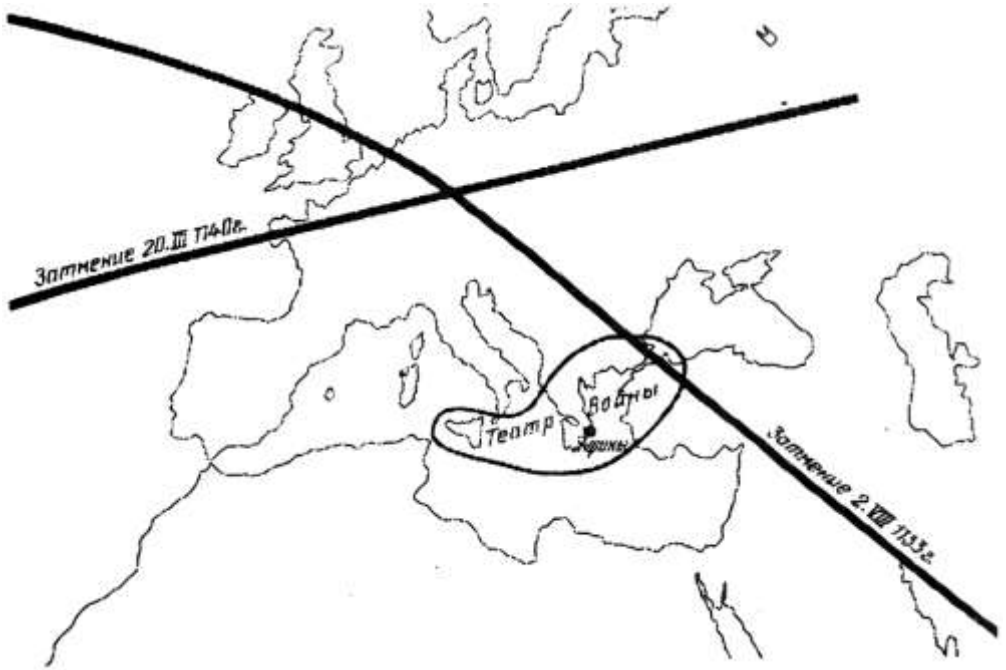
Eclipse II (20.III 1140). The band of the total eclipse begins in the morning in southern Mexico, crosses the Atlantic Ocean, passes over La Manche, northern Germany, and central Russia in the afternoon, and stops behind the Ural Mountains. In Athens it is partial. According to Thucydides' text, this eclipse occurred in March.

Eclipse III (28.VIII 1151). A partial lunar eclipse with a phase of 4.0 with a zenith point ($+8^\circ$, -7°). Visible in Europe.

This triad may raise the objection that the band of the total shadow of the eclipse I covers Hellas. However, this requirement does not necessarily follow from Thucydides' text, but it satisfies the weaker condition 1.

Anyone who wishes may check, using, say, Ginzel's tables, these statements of Morozov, by writing out all triads of eclipses for any period of interest and then making sure whether they satisfy conditions 1–6. All necessary information can be found in [16] or in [10].

Eclipses I and II found by Morozov are shown on Map 2.



Eclipse of 20.III 1140. Eclipse of 2.VIII 1133. Theater of the war. Athens.

Thucydides' apocryphalism

Thucydides' three eclipses are direct evidence proving that **Thucydides' work was not written until the 12th century A.D.**

It is absolutely improbable that Thucydides imagined his three eclipses because then there wouldn't be any triad at all.

(fundamental astronomical feature: chance of random coincidence can reach millions to one – tr.)

At the same time, it is difficult to consider these eclipses as late insertions: they fit too well into a continuous and detailed narrative. Besides, if we refuse to trust Thucydides in the eclipses, what grounds would we have to trust him in everything else?

We emphasize that above we have already justified the apocryphal nature of Thucydides' writing without any reference to astronomy. The dates of eclipses only support the conclusion of its apocryphal nature and clarify the time of its true creation.

It is doubtful, however, that the text of Thucydides known to us belongs to the 12th century exactly: its purely literary merits apparently exceed the possibilities of that century. Rather, it was written much later (just before the printed edition), but certainly on the basis of fairly detailed materials dating back to the XII century (whose author lived, apparently, in Constantinople i.e. in the city located in the area where the eclipse of 1133 was complete).

Moreover, an author of the 12th century would not need to describe his contemporary events in a distorted, coded form, and he would not have managed to do so: his

contemporaries would have exposed the deception immediately.

We will probably never know who collected the original material for Thucydides' book in the 12th century and who and why was the author of the final text. We may, however, note the figure of Gottfried de Vilgarden, founder of the famous Vilgarden dynasty, the famous historian of the Fourth Crusade. "...As a warrior-diplomat, Gottfried de Vilgarden is one of the most energetic leaders of the Latin Crusade, and this latter he also described in his famous chronicle, the first medieval historical work written in the vernacular" ([18], p.146).

It is not excluded, that he could also write the history of the previous decades of Greece (and nearby countries), which later formed the basis of the "Sunegrafae." However, not having sufficient data on Vilgarden's biography, we do not insist on this assumption. One thing is now indisputable: Thucydides' book is the brainchild of the Renaissance. As Morozov writes:

"Thucydides' book is not antiquity, it is not the Middle Ages, it is at least the 13th century A.D., it is the Renaissance,

understood not as a renewal of something forgotten for thousands of years, but as a peculiar burst of new literary creativity, the characteristic technique of which was the *apocrypha*, i.e., concealment of one's own works with the invented names of ancient authors that never existed" ([4], p.531).

But if Thucydides' work goes back to the 12th century, then, apart from the eclipses, there must be traces of other realities of this century. And indeed, even a cursory comparison of Thucydides' "History..." with the history of the Crusade reveals, as Morozov noted, numerous parallels. For example, the famous Thucydides' plague is quite similar to the plague epidemics mowing down the Crusader rows.

In the opinion of Morozov, particularly many interesting coincidences with the history of the Peloponnesian War reveal the war between the Byzantine Empire and Roger II, the Norman king of Sicily, that occurred just during the eclipses of 1133–1151 (see [5], p.175).

Athens and Sparta

Up to a certain (not very high) level of development of productive forces, the development of cities and their role were largely determined by their geographical location. For example, the rise of Moscow depended on its location at the crossroads of river trade routes in the center of a prosperous economic region.

Let us take a look at Athens. Here is what Morozov writes:

"Could a center of a strong state have ever been here in the past, capable of exerting any influence over Italy, Sicily, the Balkan Peninsula, or Asia Minor?

Never! The surrounding countryside is too poor physically, compared with these countries, for the basic population here to ever provide sufficient material assets to maintain a strong striking nucleus capable of being thrown over victoriously into the countries I have named. *Athens, by its nature and geographical position, is nothing more than an inn, a mere station... for merchant ships coming from Naples, Messina, Venice, and Lombardy to Adrianople and*

Constantinople, and vice versa. Because of this, Athens was bound to become - in the Middle Ages, when long-distance sailing ships appeared, and even after that - a rather rich and cultured, but certainly not powerful city... Athens couldn't ever be a strong city. An innkeeper cannot go to war with his lodgers... If there was some ancient town interested the most in keeping the general peace in the Mediterranean basin, it was Athens indeed" ([4], p. 491).

In Ch. 18, where, in particular, the medieval history of Athens is explored, we will see that these theoretical positions are fully supported by facts.

Further, Morozov asks how "a war on such a vast scale as that described by Thucydides, covering the entire Mediterranean basin, could have arisen only because a mountain village of Sparta, which by its geophysical conditions could never be (neither in the past, nor now, nor in the future "till the end of time"!) any kind of cultural state center - quarreled with the provincial town of Athens, which too could not be... the paramount center of culture and state life on a relatively large scale?

And if this war was not caused by a quarrel between the village of Sparta and the provincial town of Athens, why does Thucydides describe it as a war for the world (on the scale of those times) hegemony of these two pygmies among the surrounding, many times larger nations on the shores of the Mediterranean Sea?

From this viewpoint, we have no other choice but to assume that either the entire work of Thucydides is a wild fantasy novel, or *that behind the names of Sparta and Athens incomparably more powerful cultural centers are hidden as pseudonyms*, and under Peloponnesus, the entire basin of the Mediterranean Sea is described... Only that way, Thucydides' book would be the real history of the struggle between two first-class cultures of the Mediterranean, like the Latin West and the Hellenic East, whose actual state centers are hidden by Thucydides under the pseudonyms of Athens and Sparta..." ([4], p.489).

Elsewhere, Morozov returns to this thought once more:

"The same can be said of famous Sparta, whose insignificant population in its small Lakaeon Gorge, on a non-navigable mountain river of Eurotas, without any mineral

wealth and fuel to process them, raised itself, according to Thucydides, to a great cultural height, apparently in no other way than grabbing each other by the armpits, pair after pair, and then flying away... to war for hegemony in the Mediterranean. Reading the "History of the Peloponnesian War," at the first moment I thought that I was dealing with some grandiose hoax, and only after astrological determination of four (as it is in Morozov's - Auth.) eclipses indicated there it became clear to me, *that in this case pseudo-Thucydides actually described the struggle for the hegemony of Latin West versus Hellenic East*, and that the name of Sparta (or Bridle in Greek) supposed to mean Rome, and Athens supposed to mean Byzantium, and that his entire book should be considered a work of the Renaissance or its eve" ([2], p.683).).

Beginning of Athens

It is possible to argue with Morozov's latter conclusions because everything looks more majestic in close-up and the history of the microscopic struggle of two small towns under the feather of a direct participant of the events could easily take universal scale, but the general conclusion about the

geographical unfitness of Athens (and Sparta) for the role of large political and state centers looks very convincing.

But if Morozov is right in this respect, we must regard not only Thucydides' "History" but also all our other sources on the history of "classical Greece" as medieval Apocrypha. One of the most important of these sources, "the History" by Herodotus, will be discussed in § 6, but for now, we will consider this matter from a slightly different perspective.

From "classical Greece" we have not only written evidence (the authenticity of which, as we see, has every reason to doubt it) but also monuments of material culture - the ruins of architectural structures and art objects. If Morozov is right, then all these monuments must also be of medieval origin. First of all, the question arises here whether they could have been created in the Middle Ages according to the general conditions of life at that time (the level of development of productive forces, crafts, culture, and art). With respect to objects of art, we will consider this question in Chapter 4, and with respect to architectural monuments - in Chapter 18. However, there is a way to decide who is right, more simply and reliably, if we turn to the early medieval

written evidence dating to a period beforehand earlier than the possible time of medieval construction of "classical" temples and palaces. It turns out that here, too, everything speaks in favor of Morozov's viewpoint!

A detailed review of all the medieval information about Athens can be found in the book by the German scholar Gregorovius "History of the City of Athens in the Middle Ages" (see [16]). From this book, we learn **that the real history of the city of Athens begins around the 10th century A.D.**, and past that it is almost invisible. As Gregorovius writes, "The fortunes (of Athens - Auth.) during this epoch are covered with such impenetrable gloom that most monstrous opinion has even been exhibited... as if *Athens had become an uninhabited scrub forest from the 6th to the 10th century*" ([18], p.41). This opinion was first expressed by the German scholar Falmeraiier, who based it on a number of documents **he** found. Naturally, it provoked an explosion of denials among classicists (see [16], notes on p.41) and, as Gregorovius states, nowadays "the evidence for the existence of Athens at the darkest epoch has been obtained quite incontestably" ([18], p.41). But this statement of Gregorovius is still essentially unsubstantiated, when the fact is that "it was necessary to

look for special proofs just to clear up that the most honorable city of a historical country was still dwelling in his existence at all" ([18], p. 41).

Believing sacredly in the existence of Athens in antiquity and wishing to reconcile that belief with the documents he had obtained, Falmeraiier assumed that the Avaro-Slavs slaughtered all "classical" Greeks at the end of the 4th century A.D. Otherwise, he couldn't explain why in the early Middle Ages the place of Athens (and other Greek cities) was covered by thick forests. This explanation is, of course, feeble even just because the mass slaughter of the Greek population would certainly have been noted by Byzantine chroniclers. Furthermore, what Falmeraiier fails to notice is that if the forest had covered the "classical ruins," traces of it would have been visible on them even up to this day. Therefore, the logical conclusion from the documents that Falmeraiier found is the claim that **all these ruins belong to a later time.**

Not doubting the existence of Athens and its "classical" buildings, Gregorovius nevertheless notes that at that time "the city of Athens was giving Byzantine chroniclers only rare occasions to touch its affairs even in passing" ([18], p. 42),

simultaneously pointing out that the same is the case about the whole Greece in general. When he begins considering these "rare occasions," one cannot but be struck by the dryness and brevity of the information.

For example, Paul Deacon informs, that emperor Constantius II (aka Constantine III) in 662 spent half a year in Athens, but as Gregorovius bitterly notices, neither he nor other chroniclers do not inform about any details, "neither any name of any Athenian, neither local officials nor urban monuments; in a word, they note only the bare fact of the emperor's stay in Athens" ([18], p. 43). Weren't these reports later interpolations?

Equally dry and uncertain is the information from ecclesiastical sources. As Gregorovius writes, "at the beginning of the Middle Ages, the spiritual activity of the Athenian Church escapes our judgment," adding that "not a single one of the seven ecumenical councils met in the ancient Greek cities" and concluding that "the whole ecclesiastical history of Athens appears to us as insubstantial and dull as the civil history of that city" ([18], p. 47).

The "insubstantiality" of history is always one of the strongest clues to its apocryphal nature because in authentic sources one cannot but slip in lively and colorful details.

"After the brief stay of the emperor Constantius in Athens, this city is again hidden from us in darkness without history. For a long time, not a single glimmer of light fell on the forgotten city. Only consequent to the famous quarrel over the worship of icons... Greece awakens to life again temporarily (!? - Auth.) and shows its activity before us" ([18], p.50).

This "awakening" is the revolt of the inhabitants of Cyclades and Cosmas Agellianus, against Byzantium, quickly suppressed by the central government. However, "to what extent the city of Athens took part in the Greek rebellion, we do not know" ([18], p.53).

In fact, the first mention of Athens after 662 in the Byzantine chronicles dates back to 752 (nearly a hundred years later!), and even that just as the birthplace of Empress Irene. Athens reappeared later in 807 on a similar occasion of the marriage of Irene's niece, the Athenian girl Theophano to the heir to the Byzantine throne. Gregorovius attaches

inordinate importance to these two facts, deriving from them a whole aerial castle of hypotheses about remnants of the "former greatness" of Athens at that time. Of the manner and level of reasoning of Gregorovius (who is still a very cautious person compared to the other "classics"), you can get an idea from his following words, which we do not even consider necessary to comment:

"Had it been possible to penetrate into the darkness of the history of Athens and other Greek cities in the VIII century, we would certainly have discovered a powerful party of iconoclasts maintaining relations with Rome, ruled by zealous bishop monks. This party expected to avenge the experience of persecution through rebellion, under the leadership of Cosmas Agellian, and, very probably, in the eyes of the Byzantines, who had long regarded the Athenians as pagans, these latter now had the reputation of iconoclasts. So Irene, before entering the capital, too, must solemnly renounce the worship of icons..." ([18], p.61).

According to Gregorovius, the importance of the female Athenian empresses lies in the fact that they "reminded us of the existence of our own city even in times of increasing

barbarism and ignorance. This is all the more remarkable, because not a single Athenian, or in general a native of ancient (i.e. continental - Auth.) Greece not just did not come to the Byzantine throne, but during the existence of the Eastern Roman Empire did not even shine for the history on any outstanding field" ([18], p. 65).

The latter information, once again emphasizing the insignificance of Athens, is fully consistent with Morozov's general tenets. As for the "Athenian empresses," even if the information about their Athenian origin is not a late deliberate insertion, where is the guarantee that the chronicler, to whom this information goes back, meant Athens as modern Athens exactly? After all, he gives no details allowing for identification.

"After the fall of the Empress Theophane, Athens, like other Hellas, faded from the scene of history so much, that it is difficult even to find anywhere else the very mention of this city compared with contemporary events. Only Peloponnesus, where Slavs became most firmly established, gave Byzantines an excuse to interfere with Greek affairs for this very reason" ([18], p.66).

Even a hundred years later, "neither history nor tradition breaks the silence, which envelops the destinies of this venerable city. This silence is so impenetrable, that a researcher of the traces of the life of the famous city in the described centuries rejoices, as for a discovery, upon stumbling on even the most insignificant data, like one given in the "hagiography" of St. Luke, how the wonderworker visited Athens, prayed in the parthenonian (!? - Auth.) church and found refuge in one of the monasteries there" ([18], p.74). How in this situation does one even ask unpleasant questions about the authenticity of discovered information...

However, by that time, Athens was mentioned, especially in church documents, often enough to assume, with some certainty, that it already existed. For example, at the 8th Ecumenical Council, the Athenian bishop Nikita spoke, and in 887, the emperor Leo VI exiled his opponents to Athens. Before 869, the Athenian bishopric was transformed into a metropolis. Among the competitions of the empire, it occupied 28th(!) place (see [18], p.75).

Thus, by the end of the 9th century, Athens appear before we as recently emerged "uninhabited woodland," a

minor frontier town that was a place of exile. It is of some importance only as an ecclesiastical center. According to Byzantine historians, at this time fell an intensified Christianization of the "pagan" population of Slavic Greece, conducted mainly from Athens. This explains why the stateless town turns out to be the center not just of a bishopric, but even of a metropolis, although it occupies 28th place only. Such was the real beginning of the history of Athens.

The first non-ecclesiastical reference to Athens, which apparently can be trusted, is Kedrenos' account of Emperor Basil II of Bulgaria's visit to Athens in 1018. But Gregorovius laments: "Those few Byzantian chroniclers who deigned to mark this important event for Athens, briefly say that in the church of the Mother of God, the emperor served divine worship for the victory granted to him over the Bulgarians and decorated the temple with numerous wonderful gifts, and then kept the further way to Constantinople. Chroniclers did not say a single word about the duration of the stay of the emperor in Athens, nor about what he was occupied with, what he was arranging there, and what he was in charge of" ([18], page 78). It was obviously a simple daytime rest on the

way home, which does not prevent Gregorovius from fantasizing in an already familiar style:

"And meanwhile the honorable Acropolis for the last (and the first - Auth.) time shone with the splendor of the Byzantian imperial court and strategists, bishops, judges, archons, and deputations from all Greek cities assembled here around the emperor of the East crowned with victory" ([18], p. 78).

Epigraphic Monuments of Athens

Gregorovius (see [18], pp. 100–101) is struck by the almost complete absence in Athens of epigraphic monuments of the Middle Ages (not just of currently observed time but of later periods as well). There are scattered and poorly informative inscriptions only, made by Athenian priests at church entrances, consisting of prayers or necrological information. Some of them, too, contain information about the construction and reconstruction of the churches.

Despite the acknowledged authenticity of these inscriptions, specialists are wary of them because of their

illegibility, making one doubt their correct reading. Interestingly, even when these inscriptions can be read, the information they report is largely at variance with the testimony of books and handwritten sources.

It is believed that the earliest of these inscriptions date back to the 9th century (although there is one doubtful inscription, allegedly from the 7th century), but most of them belong to the 12th century. The most recent inscriptions belong to the latest times.

Noting the scarcity of these inscriptions, Gregorovius (see [18], p.101) tries to explain the absence of "other numerous epigraphic monuments" by their destruction during the Turkish domination, because "it is inconceivable, certainly, to suppose that the medieval Athenians limited themselves to this miserable epigraphy only." But he does not explain why the inscriptions on the church doors have survived while all other inscriptions have completely disappeared, although he should know that the disappearance of "numerous" inscriptions is only possible if they are being destroyed, deliberately and systematically (and even then some traces remain).

Gregorovius cannot understand why the "long row of Christian grave monuments" preserved in Rome is completely absent in Athens, although by this time many ancient monuments and inscriptions had been found in Athens.

From the viewpoint of Morozov's theory, of course, there is no problem here: **the poverty of the medieval Athenian necropolis is explained by the fact that all its monuments are attributed to antiquity.**

The same applies, of course, to other epigraphic monuments, about whose absence in Athens Gregorovius complains vainly.

The Myth of Athens

In the 12th century, Athens is still completely neglected and, for example, the Byzantine scholar and philosopher Michael Akopinath, forced to live in Athens, complains in his letters about the general lack of culture and "rustic way of life" in Athens.

At the same time, however, the view of Athens as a center of learning and wisdom is crystallizing throughout the

cultural world, and this view is stronger the farther we get from Athens itself.

We shall look at this in more detail in Chapter 18, but for now only note that at that time the name "Athens" was **the common name** for the centers of education and wisdom, and its fame as a city of all kinds of scholarship was fueled by numerous tales that are now regarded as "fable." The heroes of the chivalric novels, which were taking shape just at this time, studied the sciences not elsewhere, but necessarily in Athens. Gottfried of Viterbus wrote that the sciences in Athens trace their origin directly back to Jupiter, who was the first king of Athens (see [13], p.114).

The numerous clues showing that **the myth of Athens originated far away from Greece** we will also discuss in Ch. 18. For now, we will only point out that even Greek geographical titles were obviously invented far away from Greece itself. Take, for example, the term Peloponnesus, which in translation means "the island of Pelops"! Only a person who has never visited the peninsula (which in Greece itself bears the name "Moreia") could have called it so.

§ 3. Solar and Lunar Eclipses and Chronology

Solar eclipse is the most striking (of all non-disastrous events) phenomenon that a man can observe during his lifetime. So it is not surprising that an ancient man sought to record this rare event not only in his memory but also in writing. The idea of using eclipse reports to date documents goes back to the 16th century, along with the birth of modern astronomy, and has been exploited since then by dozens of researchers, there is no point in listing them here.

The Eclipse Canons

The creation of the astronomical basis for the realization of this idea is described as follows by Prof. A.A. Mikhailov (we reproduce Mikhailov's text word for word, only deleting references to literature)

"...numerous mentions indicating dates of solar and lunar eclipses in the annals present almost the only possibility of establishing the corresponding date according to the Julian calendar and thus creating a correct chronology.

All these tasks require... possibility to establish easily and quickly the moments and the most primary circumstances of visibility of past eclipses before the most

ancient historical sources. In this regard, many different aids in the form of tables and catalogs have been created to provide the required information with more or less detail, accuracy, and convenience. Tables intended for this purpose were included in the first edition of the book "The Art of Date Determination", compiled by Benedictine monks in 1750 and pursuing chronological goals (available for Muscovites in the Library of the Planetarium, 1819 edition – Auth.). Originally covering the time interval from the beginning of the A.D., it was expanded in the second edition to include the tables of Pengre, covering the previous ten centuries. La Rjegot made tables to calculate the phases of the moon, the syzygies, in particular, accompanied by eclipses... More accurate tables, giving numerous auxiliary values for calculating eclipses, are given by Hansen. On their model, even more precise and complete tables of Oppolzer are made, and also tables of Lehmann, and Newcomb's tables serve the same purpose. For calculating lunar eclipses particularly, Oppolzer's tables were compiled.

Numerous publications called the eclipse canons, contain (that's how it is in Mikhailov's - Auth.) the most monumental of them: the Oppolzer *Canon*, published in 1887 and covering

8000 solar eclipses from -1207 to +2161 and 5200 lunar eclipses from -1206 to +2163.

For each solar eclipse, the moment of its midpoint and about 20 auxiliary quantities are given with respect to Hansen's theory for more detailed calculation according to the formulas given in the preface.

For total and circular eclipses, the geographical coordinates of the three points of the central lines are also given, namely, the starting point where the eclipse begins at sunrise, the middle point where it begins at noon, and the endpoint where the eclipse ends at sunset.

For lunar eclipses, given the moment of its middle, the magnitude of the greatest phase in "inches," i.e., in 1/12ths of the Moon's diameter, half the duration of the total and partial phases, and the geographical coordinates of the point on the Earth's surface where the Moon is in the zenith at the moment of the greatest phase.

The Canon comes with a so-called iconography in 160 maps drawn in Postel's polar projection, depicting the northern hemisphere of the Earth and part of the southern

hemisphere till -30° latitude with the drawn central lines of all total and circular eclipses passing through this area.

...The Oppolzer *Canon* is a basic summary of all eclipses, to be used primarily for obtaining preliminary information on eclipses of the current time, as well as for any research in the field of historical eclipses. Although the auxiliary quantities for solar eclipses given in *the Canon* enable us to calculate more detailed data both in terms of the visibility of eclipses for a given place and in terms of the position of a line that determines the course of an eclipse for the Earth in general, this calculation is still rather laborious and may present some difficulties for persons unfamiliar with computing technology, such as historians.

Given this, Schram has compiled auxiliary tables that make it easier to obtain additional information from Oppolzer *Canon's* data, although at the expense of somehow reduced accuracy.

For old eclipses, Oppolzer's data is inaccurate, and one of his collaborators on *the Canon* — Ginzel — soon after the *Canon* was published, derived empirical corrections for it on the basis of processing observations of medieval eclipses.

Schram, in his second work, based on these corrections, compiled tables directly correcting Oppolzer's auxiliary quantities. How serious the canon's errors are, can be seen from the following:

Year	Error in the Oppolzer Canon	
	in moment	in geographical longitude
0	20 minutes	5 degrees
-500	40 minutes	10 degrees
-1000	60 minutes	15 degrees
-1200	75 minutes	19 degrees

The desire to process the observations of numerous historical eclipses to refine the theory of the lunar motion, on the one hand, and the desire to provide historians with more convenient means of identifying historical eclipses, on the other, prompted Ginzel to compile *the Special Eclipse Canon*, giving, firstly, the corrected elements of all 455 eclipses of the Sun visible within the ancient cultural lands around the Mediterranean Sea and Mesopotamia (more exactly between 10° West and 50° East and between 25° North and 50° North) between -900 and +600.

Further are given moments and magnitudes of the greatest phase for the cities: Rome, Athens, Thebes, and Babylon, and also the magnitude of the greatest phase for points with rounded geographic coordinates (every 5° latitude and 10° longitude).

Then, follow the coordinates of the northern and southern boundaries of the band of the total or ringlike phase. The list of 1627 lunar eclipses for the same time interval contains indications of their visibility conditions in the four cities mentioned.

This is followed by a comparison of the calculations with observations of numerous historical eclipses, and finally by maps showing the bands of total and circular eclipses.

Ginzel's work was continued by Schroeter. His *Special Canon* contains data for 300 central solar eclipses and 671 total lunar eclipses occurring between 600 and 1800 AD in Europe (more precisely, between 30° W and 75° E and between 30° and 70° N), in even greater detail than Ginzel's. Thus, for solar eclipses, not only the boundaries of the band of the total or ringlike phase are given, but also the position of the northern and southern 9-inch isophases (the lines where

the partial eclipse reaches 0.75 of the Sun's diameter), also shown on the maps. For total lunar eclipses, the points are given at which the Moon rises and sets at the moments of the beginning and end of the partial eclipse and greatest phase.

The Ginzel Canon was continued into the depth of centuries by Neugebauer. His calculations cover solar eclipses visible between -600 and -4200 in Asia Minor, Mesopotamia, and Egypt, and give the moment and magnitude of the greatest phase for the six capitals of the ancient world.

For the time interval covered by Russian history M.A. Vilyev made *the Russian eclipse canon*, given in the appendix to the book of D.O. Svyatsky "Astronomical phenomena in the Russian annals." This canon contains a list of solar eclipses between 1060 and 1715 giving the time and magnitude of the largest phase for some average point with latitude 55° and eastern longitude 32° (near Smolensk) and contains maps showing the bands of total and ringlike eclipses for European Russia. There are also compact tables for calculating lunar eclipses.

...In conclusion, note that collections of tables intended for chronological purposes also contain, usually in a more or less detailed and accurate form, tables that allow calculating syzygies and, in particular, those accompanied by eclipses. Such are the chronological tables of Schram and Neugebauer. The most precise tables of syzygies, modeled on those of Oppolzer, are published by Schoch in the studies of the Berlin Computing Institute" ([24], pp. 28–31).

We shall add a reference to the fundamental work of Ginzel [10], containing refined tables.

To make his corrections to the Oppolzer Canon, Ginzel used the 21 solar eclipses described in the sources, whose dates extend from 590 to 1386 (see [16], p. 4). Therefore, Ginzel's corrections can be trusted only insofar as one can trust the correctness of the dates of these eclipses.

At the same time, with a maximum eclipse fringe width of 4° , the Ginzel corrections are quite significant. Although, as we have already noted, errors are inevitably accumulated during the calculation of eclipses of a distant time, it is doubtful that these errors would be so significant. Was it

all for nothing that Ginzel trusted the medieval sources (especially the earliest ones) so blindly?

The Nicolsky's Categories

Let us now consider how all this astronomical machinery is applied to establishing historical dates.

It turns out that only in very rare cases its application can be carried out with complete reliability. Here is what professor Nikolsky, one of the most thorough critics of Morozov's theory, writes:

"The astronomical method, of course, has a great advantage that it can give perfectly accurate data. But its accuracy is certainly not absolute, but conditional, and its applicability is limited. Undoubtedly, when a perfectly definite astronomical problem is given, proceeding from definite data, its solution will be perfectly definite and exact. (This is written by a historian. Whereas we know that even this particular case is not always true. – Auth.) ...It's not about that, it's about the conditions of the problem. Is it set up correctly? Because if even a single element is changed, the solution will be very different.

In the case of the application of the astronomical method to historical science, the most important difficulty indeed is the formulation of the problem. Almost always, we must deal not with direct astronomical indications, but with confused and incongruous reports of ancient monuments. There can be three categories of cases here.

The first, the rarest, but always fruitful, is when the text leaves no doubts about the meaning of astronomical content. The astronomical method provides immeasurable service to the historical science in such cases. . .

The second category of cases also deals with texts, albeit purely astronomical, still unclear in their content or terms... Unlike the previous category, such texts can't be firm reference points because different interpretations will yield completely different results; the exact result can be obtained only if numerous painstaking auxiliary studies will successfully establish the correct interpretation of the text.

The third category of texts is the most dangerous. These are texts whose astronomical content is doubtful and astronomical phenomena are not named as such, but there are symbols allowing for astronomical interpretation. Since

the intentions and thoughts of the author, who hid them behind symbols, usually remain unknown, we can, of course, also propose an astronomical interpretation, but only as one of the possible hypotheses, also not eliminating the possibility of all other hypotheses. Besides, the astronomical interpretation itself can also be diverse in such cases" ([52], pp. 160–161).

Completely supporting these general considerations of Nikolsky, we specify them for the case of solar (and lunar) eclipses, which, as a rule, fall under the first (or second) Nikolsky's category.

Hardships of eclipse dating

The ideal case is when the eclipse is described in detail and the place and time (month, day, and hour) of the eclipse are precisely specified. In this case, it is enough to check in the canons of Oppolzer or Ginzel to establish the date. If at least one element of the description is omitted, the case is usually quite bad.

For any location in almost every century, it is possible to find a solar eclipse that occurred in that location. Therefore,

additional information is almost always needed for reliable dating.

For example, we managed to date Thucydides' eclipses accurately mainly just because there were three of them with precisely defined intervals between them, and there are very few such triads.

Very often the information available in the ancient document does not correspond to the data of astronomy: in a period which, according to traditional history, the document concerns, there is no eclipse possessing all the features specified in it (an example is eclipses of Thucydides). In such a situation, they usually find an eclipse only partially satisfying the conditions, or on the basis of very slippery and, as a rule, purely hypothetical considerations they fit the document data to the desired eclipse. An example of such supposedly "astronomical" dating is the traditional dating of the Peloponnesian War.

With regard to the calendar, too, a wide scope for data reinterpretation opens. We have already discussed the calendar problems in § 8 of Chapter 1, but now, to emphasize the independence of the "astronomical" approach from the

results of this discussion, we will not use these results and will approach the calendar issues from a slightly different perspective.

The Calendar Hypotheses

By conventional wisdom, the stable Julian calendar (with lenticules) existed since 46 B.C. (Later we will discuss this date and show that in fact the Julian calendar was not introduced until the 4th century A.D.; but for our current purposes the date of the introduction of the Julian calendar does not matter; in fact, the earlier it was introduced, the more important it is for our theory.) Before that, according to the same traditional notions, Rome had an extremely confusing calendar, with no regularity whatsoever. This shakiness and uncertainty of the calendar allow historians to shift (technical and not so odious term "to interpret") the dates given in the sources at will (we will see examples in the next paragraph).

In general, historians of antiquity have an irrepressible desire to shorten the calendar year as much as possible (they are ready to use any, however vague indications of the texts

for this purpose). Apparently, the record is a year of 346 (!) days (see [10] vol.2, p.175). This shortening results in a calendar drift against the Julian calendar, which makes it possible to treat an indication of a particular month as an indication of almost any other month of the year (for example, the text says "July" but it can be read as "September"; see next paragraph).

The numerous ways of fitting dates that exist are generally referred to as "calendar hypotheses." We emphasize that these hypotheses are usually based on extremely vague and ambiguously interpreted indications of texts. Unsurprisingly, the number of "calendar hypotheses" equals the number of researchers engaged in calculations of ancient dates.

Therefore, Morozov is absolutely right, stating that **where "the calendar hypotheses" begin, any rational use of astronomy ends.** Combining astronomical data with "calendar hypotheses," you can prove anything, but the validity of such proof has nothing to do with the credibility of astronomy.

Morozov proposes to consider all dates of ancient documents as Julian (and thus to read, in particular, "July" only as "July" and "September" only as "September"). The methodological advantage of this, one can say so, another calendar hypothesis is about it being accepted once and for all, not changing when we encounter an "inconvenient" date. It is justified by the fact ascertained a posteriori: it leads to uniform results without a disorderly purely random scatter (as would be the case if this hypothesis did not correspond to the truth at all).

Exactly, as we will show below (see § 5), in every case with sufficient astronomical information in an ancient document, there is an existing (and usually the only) late eclipse (usually belonging to the Renaissance or time immediately preceding it) that fully meets the conditions described in the document (so the situation with Thucydides is not the exception, but the rule).

If the astronomical information contained in the document is scarce, it is possible to pick up many eclipses, both ancient and medieval, satisfying all conditions. Therefore, in such cases, the reference to the astronomical

confirmation of the ancient date of the document is nothing but a direct deception.

From the viewpoint discussed in chapter 1 § 8, "Morozov's calendar hypothesis" is not a hypothesis, but a natural conclusion from the general theoretical positions developed there. Thus, certain confirmability of this "hypothesis" with the results obtained during the dating of eclipses supports these theoretical provisions.

§ 4. Examples of Astronomical Dating

(Titus Livy, Homer, Takelot)

To illustrate the general conclusions drawn in the previous paragraph, we will consider four examples: two from the Roman chronology, one from the Greek, and one from the Egyptian.

The Solar Eclipse in Livy's

In Titus Livy's Dec. IV, we read (see [5], p. 275): "When the consul went to war from the port of Brindisi during the festivals in honor of Apollo, 5 days before the Ides of July, in the afternoon, in clear weather, an eclipse occurred, as the Moon came under the disk of the Sun" (Livy, XXXVII, 4,4).

Note that the author understands the nature of eclipses perfectly. Scaliger and Petavius, assuming that July fell in modern March, dated this eclipse as March 14, -189. Their calendar hypothesis is now more or less generally accepted, but, for example, Stockwell and Seyfarth prefer a different hypothesis, from which the date of July 17, -187 follows (see [16]. pp. 189–190).

What happens if, following Livy honestly, we'd look for the eclipse not from the a priori hypotheses, but by the date of July 10 given by Livy (that is "5 days before the July Ides")? In this case, to avoid the error (associated with the possibility of another point of reference to the beginning of the day, different from the currently accepted), we should also add July 9 and 11 and thus look for an eclipse visible in southern Europe (great accuracy is harmful here) occurring on July 9, 10, or 11 of an unknown year.

Looking through Ginzel's tables (and Oppolzer's tables for control), we may be convinced (anyone can do it with some patience) that **between -800 and 1589 A.D. there was the only solar eclipse fully satisfying the conditions:** this is July 10, 967 A.D. eclipse visible in Rome and Athens with the phase of 10.8 (9/10 of the Sun's disk covered). In Italy, this eclipse occurred in the morning (the middle of the Earth's trajectory was passed at 6:58), was perfectly visible, and the Moon came under the disk of the Sun.

This eclipse was first pointed out by Morozov (see [5], pp. 274–283). Morozov, in addition to this eclipse, cites and discusses two other eclipses: July 10 +530 and July 10 +1032,

but they fall away due to the insignificance of the phase. For example, an eclipse of +530 is not even marked on Ginzel's maps in [16].

Livy's Lunar Eclipse

Livy's Decade V (see [5], p. 268) states:

"The time of the summer solstice had also passed. When the fortification of the camp was finished (the war against the king Perseus in Macedonia is described. - Auth.), the consul Sulpicius Gallus, the tribune of the 2nd legion, announced, that "in the next night - no one shall consider it a miracle! - from the 2nd to the 4th hour of the night there will be a lunar eclipse. Since this phenomenon occurs naturally and at a certain time, one can know about it ahead of time and *predict* it. Therefore, just like they are not surprised to see the Moon in a full circle or in the form of a little horn when it is scraped out because the Sun and Moon are rising at a certain time, they should not consider it an omen when the light of the Moon is eclipsed when the latter is covered by the shadow of the Earth."

On the night before the September Nones, when the lunar eclipse occurred at a certain hour, the wisdom of Gallus seemed almost divine to the Roman soldiers. To the Macedonians, it appeared as a sad omen, foretelling the fall of their kingdom and the destruction of their people. This is how the soothsayer also explained the vision. The shouts and cries arose in the camp of the Macedonians until the moon again shone with its light" (Libyan, X IV, 36–37).

We are told that this astronomical lecture was read before the "iron legions" of ancient Rome two thousand years before our days, when there was no Julian calendar and, therefore, no regular astronomy! Although the text clearly refers to September, Petavius gave the date June 21, -167, justifying his choice with an appropriate calendar hypothesis of course, but not paying attention to the fact that in -167 the summer solstice was June 23, and the speech of Gallus is made after the solstice, not before.

This strain has long displeased chronologists, but there is no other more suitable eclipse near this date, and so (!) this date was set. Actually, Ginzler tries to justify this date with references to Polybius and Plutarch, who allegedly describe

the same event (see [16], pp. 190–192), but, of course, this does not eliminate the stretch itself.

Understanding the text of Titus Livy literally, i.e., considering September as September, we should find the lunar eclipse occurring the night from September 4 to 5 from 2 to 4 a.m. local Macedonian time (which differs from Greenwich time by about an hour and a half). To rule out the possibility of error in interpreting the expression "the night before the September Nones," we will add two more nights from September 3 to 4 and from September 5 to 6.

Looking through the Ginzel tables (see [10] or [16] and also see the Oppolzer tables for control), we can see that **there were only three lunar eclipses satisfying these conditions.** The first occurred on the night of September 3 to 4, 936 A.D., and was a supertotal eclipse with a phase of 14. The second occurred on the night of September 4–5, 415 A.D., and the third occurred on the night of September 4–5, 955 A.D. The last two eclipses fully satisfy all the conditions of the problem, and so does the first one but with the assumption that "the night before the nones" is the night from the 3rd to the 4th of September.

These eclipses are described in detail in [5], pp. 266–272. In [5] on p. 269, an eclipse of -106 is also mentioned, but it was so insignificant in its phase that could not attract any attention, much less cause a commotion among the troops.

We are more likely to accept the eclipse of 955 because it is close to the eclipse of 967, described in decade IV.

In Titus Livy, two other solar eclipses are mentioned. We will consider them in the next paragraph.

The Eclipse in “The Odyssey”

In Song XX of the Odyssey, we find the following lines referring to the return of Odysseus:

*"...and over the sun
I can see
coming terrible shadow,
and under it
all of the ground
gets covered with darkness."*

The mere indication of the fact of the eclipse is, of course, not enough, but fortunately, the nineteenth song says:

"Before the sun completes its (yearly) circle, Odysseus will return"

and in Song 13, that at the moment of his return. . .

*"...the radiant star has risen,
the messenger of the dawn of light,
born in the twilight of the morning. . ."*

So, we must look for an eclipse passing through the Mediterranean (great precision is harmful here) and occurring, firstly, when Venus is in morning visibility and, secondly, when the Sun completes its yearly circle, i.e., passes the celestial equator. There are two such moments: before the spring equinox in March and the autumnal equinox in September. Morozov says ([4], p. 447) that Schoch, investigating this question, proposed the eclipse of April 16, 1178 B.C. However, this eclipse is not suitable because in 1178 B.C. the vernal equinox was April 1, two weeks before the eclipse, and at this time Venus was not in the morning, but in the evening visibility.

Further on, Morozov states that he looked through all pre-equinox eclipses up to the 16th century CE visible in the Mediterranean and found only three: two in spring and one in summer. The spring eclipses were on 10/III 592 A.D. and 10/III 601 A.D., and the autumn one on 3/IX 1178.

The first eclipse passed through Ithaca and Naples, but Venus was in evening visibility.

The second eclipse passed from the Sahara through Alexandria to Siberia, and Venus was visible in the morning in full brilliance.

The third (autumn) eclipse passed through Corsica, Messina, and Crete, but Venus was invisible, being lost in the rays of the evening dawn.

Thus, the eclipse that satisfies all conditions is the eclipse of **March 10, 601 A.D.**

However, Morozov does not reject two other eclipses (in fact, he definitely prefers them) because they were both much more spectacular than the eclipse of 10/III 601 and covered most of the Mediterranean. Especially spectacular was the eclipse of **September 3, 1178 A.D.**

"The Takelot's" eclipse.

See. [16], pp. 260–262, and also [6], pp. 753–764.

In the Egyptian written records, there is only one mention of the eclipse - the famous Takelot's eclipse, which caused much controversy. Egyptologists count four Takelots: one in the 21st dynasty, two in the 20th dynasty, and one in the 23rd dynasty. The inscription allegedly referring to Takelot II is on the wall of the temple of Karnak and was first published by Lepsius (1859), who translated it as follows:

"On the 15th year, on the 24th day of Hoyak, during the reign of his father august, in this country occurred... a struggling moon in the sky..."

However, as early as 1861, Birch showed that the month of Messori should be read instead of the month of Hoyak. Here is his translation:

"On the 25th day of Messori in the 15th year of the reign of his valiant father, the ruler of Western Thebes, the sky became invisible... a struggling moon..."

Gempach suggested that the inscription described a solar eclipse rather than a lunar eclipse and that Takelot II

must be the son of Osorkon III. Since Gempach attributed the death of the latter to -852, his calculation is that the 15th year of Takelot is -840, and he recognized the 25th of Messori as corresponding to March 11. Why? Just because, Ginzel writes, "in -840 there is a suitable solar eclipse only on March 11" ([16], p. 261).

However, after subsequent, more accurate calculations it turned out that **this eclipse was invisible in Egypt.**

Then, Hinks decided that the text was indeed describing a lunar eclipse, but did no better: he attributed it to April 4, -944, and, like Lepsius, he read Hoyak, 24 instead of Messori, 25 in the document. However, this eclipse was very insignificant, and after Ginzel's refined calculations, it turned out that **it, too, was invisible in Egypt.**

When this was revealed, Hinks, in desperation, attributed the description of the document to the solar eclipse of April 1, -926. But even here astronomy joked with Hinks. With more precise calculations, it turned out that **this eclipse was, again, invisible in Egypt.**

Then, Raška(Rashka) suggested to consider it, again, a lunar eclipse of March 17, -869. But again with the more

precise calculations, it turned out that **this eclipse, too, was invisible in Egypt.**

Defending his new theory of the Egyptian calendar, Raška didn't give up and named another lunar eclipse: March 16, -850. Although the phase of this eclipse was very slight, it was still visible in Egypt. But then the experts in the text deciphering got indignant and declared that the 25th of Messori could never mean March, 16. After a heated discussion, this eclipse was also rejected.

Then, Raška proposed the lunar eclipse of March 7, -822. The decipherers did not object here, but... some evil fate pursued the eclipse of the Takelot, and after more precise verification calculations, it turned out that the eclipse of March 7, -822 **was, again, invisible in Egypt.**

After Edwin Smith's copy of this document was published in corrected form by Goodwin, Shabe subjected it to a careful examination again. He was unable to obtain a single astronomical date and therefore stated that the text did not refer to a celestial phenomenon at all, but to a "rebellion, burgeoning in Egypt."

Mahler, realizing the ridiculousness of such an interpretation, looked through all the solar and lunar eclipses in Egypt that would fall on the 25th of Messori between -1045 and -745, and Raška went through all lunar eclipses visible in Egypt from -1000 to -700, but both had to state that in those 300 years not a single eclipse met the conditions of the problem and did not fall on a given day.

After all this trouble, in 1890, professor August Eisenlohr carefully photographed the inscription again under very high magnification and gave his translation of the text:

"When then in the year 15, in the month of Messori, day 25, under the dominion of Father Horus, the magnificent, divine prince of Thebes, the sky did not swallow the moon... great misfortune has come upon our country. . ."

This new translation, however, did not essentially change anything.

In this situation, attempts were made to look for the Takelot eclipse in a broader time frame (although, as Ginzel points out, "according to the traditional chronology, the XX dynasty, to which Takelot II is attributed, began from -960"; [16], p. 262). Thus, for example, Lynn attributed the 15th year

of Takehot II to -785, in which the 25th of Messori coincides with February 25 according to traditional calculations. Assuming that the text refers to a lunar eclipse, again he tries to find an eclipse, and again there is no eclipse on the specified day.

Then, Lynn, remembering Bruges' translation:

"The sky was not visible, the moon was terrible, foreshadowing the calamities of this country,"

says that here we are not talking about an eclipse, but "some kind of meteorological phenomenon."

Summing up all this discussion, Ginzel, dissatisfied with the meteorological explanation, concludes that it is more likely that the case here is about an expected but not occurring eclipse and, not to aggravate the quarrel between astronomy and Egyptian history, advises astronomers to stop all further research into the timing of solar and lunar eclipses in Ancient Egypt: "...sowird manwohl femerhin die nachsuchung nach den in Aegypten sichtbar gewesenen Sonnen- und Mondfinsternissen aufgeben müssen"([16], p. 262).

Unwilling to accept this defeatist conclusion (to which one can come, of course, only out of sheer despair), Morozov ([16], pp. 758–762) undertook a study of lunar eclipses visible in Egypt between the 17th and 19th of August (that's how he interprets date "the 25th of Messori" according to his general concepts) and found several total (and supertotal) lunar eclipses falling on this date in years after A.D. For reasons which we will discuss in Ch. 13, he considers the Takelot eclipse to be a supertotal lunar eclipse on the night of **August 17, 593 A.D.**

Conclusion

The Takelot eclipse belongs to the third category of astronomical phenomena according to Nikolsky's classification. We have cited it as a vivid example of the difficulties that appear with an attempt to astronomically date the phenomena of this category.

This example teaches us not to succumb to the hypnosis of the words "proven astronomically" and every time we encounter an astronomical dating, carefully check what

additional assumptions (for example, calendar or deciphering hypotheses) were explicitly or implicitly used in this dating.

No doubt, the date of August 17, 593 A.D. should shock the reader accustomed to the idea of the deep antiquity of Egypt. We will not discuss it now, but we ask you to keep it in mind.

The eclipse in the *Odyssey* also belongs to the third category. It demonstrates difficulties of a different kind: when the necessary characteristics of the eclipse must be literally fished out of the text that is alien to astronomy.

The received dates of this eclipse are in full conformity with the thesis discussed in Chapter 1 about apocryphal classical literature and force one to think that **at least some fragments of "The Odyssey" were not composed until the 7th century A.D.** (apparently, from travel notes of some actually undertaken journey) and, consequently, the composition of the final text occurred even later.

The dating of Livy's eclipses to the 10th century A.D. does not have the absolute reliability as the dating of the Thucydides' eclipses, because it uses the assumption that Livy's dates are given in the Julian calendar. It is, however,

entirely consistent with the features of Livy's book discussed in Ch. 1, and together they constitute sufficiently convincing evidence in favor of the medieval origin of Livy's books.

Note that the eclipse described in Dec. V occurred in 955, while the one described in Dec. IV occurred in 967. This means that the medieval compiler who compiled the final text of the Honorable Libyan confused the order of events and placed the earlier events after the later ones. Here is how Morozov puts it:

"It is evident that the order of the books, and with them the chapters in Livy's collection, is mixed up, and that we must consider each story in that collection separately, as we do the legends of Jesus in the Gospels, or we must abandon our confidence in the complete accuracy of the dating of the eclipse in question and assume that it was not noted immediately, but in its original source, it was established by the recollections of old-timers who have already forgotten the exact day of the event.

But thereby, we admit that the old-timers mixed up everything else as well... And if we will persistently assert that they were confusing only the events that we calculated

but still correctly transferred incalculable ones, and if in confirmation of incalculable we will correct the calculated - for example, moving March eclipses to December - then, certainly, we would confirm anything with astronomy.

Let us not go down this slippery slope, and if the fourth decade of the "Honorable Libyan" says (bk. 37, § 4), that on July 10–11 there was a solar eclipse in Rome because the Moon came under the disk of the Sun, then we will understand it literally, and not "allegorically," as theologians understand the Gospel, even if this would make us assume, that *the composition of Titus Livy is not a continuous consecutive narration, but a set of many separate stories*, distributed by the author in a fictional chronological connection" ([5], pp. 281–282).

In conclusion, we'd like to make a remark that the later compilative origin of Livy's books also explains the inconsistency of the information they contain and the strange parallels with Greek history. The compilers of both Histories clearly relied on the same source of information.

§ 5. Discussing the final list of Ginzel

List of eclipses

Ginzel repeatedly mentioned above was summarizing and completing the work of his numerous predecessors, having compiled a complete list of all cases in which the solar and lunar eclipses described in the Greek-Latin writings and early medieval chronicles supposedly allowed to give (or confirm) the dating of ancient events on the basis of astronomical tables. This list contains about 90 eclipses and covers the period from the emergence of Greek writing to 592 A.D.

We reproduce this list below. In the first column is the serial number of the eclipse accompanied by the letter S if the eclipse is solar and by the letter L if the eclipse is lunar. The second column shows the astronomically determined date of the eclipse, the third column shows the historical event to which the eclipse is timed, and the fourth column lists the sources.

We indicate the date of the eclipse in the so-called "astronomical" count, differing from the "B.C." count by one. For example, -243 means 244 BC. Naturally, +243 means simply 243 A.D.

Table of distribution of Ginzel's eclipses by centuries

Centuries B.C.	Number of eclipses	Centuries after A.D.	Number of eclipses
VII	1	I	9
VI	2	II	2
V	8	III	3
IV	8	IV	10
III	5	V	11
II	3	VI	12
I	3		

What draws one's attention is the uneven distribution of recorded eclipses over the centuries and their relatively small number (in relation to the number of all occurred eclipses).

List of eclipses

1	S	-647, April 5	Observation of an eclipse by the poet Archilochus, fr. 74
2	S	-584, May 28	Prediction of an eclipse by Thales, Herodotus, 1.74 Pliny, "Est.Hist.," II, § 53
3	S	-556, May 19	The siege of Larissa, Xenophon, "Anabasis," S,4,8
4	S	-479, October 2	Retreat of Cleonbrotus, Herodotus, IX, 10
5	S	-477, February 17	Marching to Abydos, Herodotus, VII, 37
6	S	-430, August 3	Expulsion of the inhabitants of Aegina, Thucydides, II, 28
7	L	-424, October 9	Election of Cleo, Aristophanes, Clouds, 584
8	S	-423, March 21	At the beginning of the 8th year of the war, Thucydides, IV, 52
9	L	-412, August 27	Captivity of Nicias. Thucydides, VII,50, Plutarch, "Nicene," 23
10	L	-405, April 15	The fire in the temple of Athena, Xenophon, "Greek Hist." 1,6, 1

11	S	-403, September 3	The victory of Lycophron, Xenophon, "Greek Hist. II, 3—A, Seneca. "On the Goods," V, 6.
12	S	-399, June 21	Observation of an eclipse by Ennius, Cicero, "On Resp.," 1, § 25
13	S	-393, August 14	Attack of Agesilaus, Xenophon, "Greek histor.," IV, 3,10
14	S	-363, July 13	The attack of Pelopidas, Diodorus, XV,80 Plutarch, "Pelopidas," 31
15	S	-360, May 12	Prediction of the eclipse by Helicon. Plutarch, "Dionysus," 19
16	L	-356, August 9	The sailing of Dion, Plutarch, "Nicene," 23, Plutarch, "Dionysus," 24
17	S	-339, September 15	The consecration of the temple of Juno, Livy, VII, 28
18	L	-330, September 20	Victory at Arbela, Plutarch, "Alexander," Arrian, III, 7, 6, etc.
19	S	-309, August 15	The voyage of Agathocles, Diodorus, XX, 5,5, Justin, XXII, 6, 1

20	S	-295, November 7 -293, March 24	Livy, X, 23
21	L	-218, March 11	Mutiny of the Galatians, Polybius, V, 78, 1
22	S	-216, February 11	Livy, XXII, 1, 8
23	S	-202, May 6	Livy, XXX, 38, 8
24	S	-201, October 19	Battle of Zama, Zonaras, IX, 14
25	S	-189, March 14	Sailing from Brindisi, Livy, XXXVII, 4, 4
26	S	-187, July 17	Meteor shower, Livy, XXXVIII, 38, 4
27	L	-167, June 21	The prediction of an eclipse by Gallus, Libyan XIV, 36, 1, Plutarch, "Em. Paul," 16-17, etc.
28	S	-103, July 19	Attack of the Cymbians, Obsequens, 43
29	S	no date	Consulate of Caelius and Domitius, Obsc. 51, 62
30	L	-62, May 3	Consulate of Cicero, Cicero, "On the Nature of the Gods," 1, 11, 18

31	S	no date	The departure of Pompey to Dyrrhanium and Caesar's Crossing of the Rubicon; Assassination of J. Caesar, Dio Cassius, X 1, 14, Lucan, "Pharsalia," 1, 540, Plutarch, "Caesar," 69, etc.
32	L	-4, March 13	Death of Herod, Josephus Flavius, XVII, 6,4
33	L	+5, March 28	Earthquake, Dio Cassius, V, 22
34	L	+14, September 27	Death of Octavian Tacitus, "Annus," 1, 16
35	S	+29, November 24	The crucifixion of Jesus, Dio Cassius, VII, 4
36	L	+33, April 3	Crucifixion of Jesus, Eusebius, II, 148
37	S	+45, August 1	Birthday of Claudius, Dio Cassius, X, 26
38	L	+47, January 1	The appearance of a new island, Dio Cassius, X, 29, Seneca "Eustis," II, 26, 6
39	S	+59, April 30	Celebration in honor of Agrippina, Pliny, "Eustis," I, § 80 Tacitus, "Annus," XIV, 12

40	S	+71, March 20	Plutarch, "On the Face in the Lunar Disc," 19
41	S and L	+71, March 20 and March 4	The reign of Vespasian, Pliny, "Est histoire," II, 51
42	S	+186, December 28	The reign of Commodus, Lampridius, 16.2
43	S	+197, June 3	Council of Utica, Tertullian, "On the Rocks," 3
44	S	+218, October 7	Reign of Heliogabalus, Dio Cassius, XXVIII, 30, 1
45	S	+240, August 5	The reign of Gordianus, Julius Capitus, III, 23, 2
46	S	+292, May 4	The accession of Chlorus and Maximus, Constantus Consularius
47	L	+304, August 31	The death of Eu Felix, Life of Eu Felix.
48	S	+316, July 6	The reign of Licinius, Avr Victor, On the Caesars, 41, 5
49	S	+319, May 6	The fifth year of the reign of Licinius, "Constantius Consularia"
50	S	+324, August 6	Council of Nicaea, Gamartal, "Chronicle," IV, 180

51	S	+334, July 17	Consulate of Optus and Pavlinia, Firmicus Maternus, "Astronus," 1, 4,
52	S	+346, June 6	Theophanes, "Chronographia," 1, 38
53	S	+348, October 9	Theophanes, "Chronographia," 1, 39
54	S	+348, October 9	Ammianus Marcellinus, XX, 3, 1
55	S	+364, June 16	Preceded by Theon's eclipse, Theon, "Commentaries," 332
56	S	+393, November 20	The third year of the reign of Theodosius, the Italian Consularia
57	S	+400, July 8	Jerome, "Against John"
58	L		Battle of Pollentino, Claudianus, "On the Beige of Pollentino," 233
59	S	+402, November 11	The ruling of Arcadius and Honorius, Hydatius, "Chronicle," etc.
60	S	+418, July 19	The youth of Theodosius II Philostorius, "Cercus Historus," XII, 8, etc.
61	S	+447, December 23	The march of Attila Hydatius, Chronicle

62	L	+451, September 26	Halley's Comet, Hydatius, "Continuation of the Chronicle."
63	S	+458, May 28	Reign of Leo, Guidaius, "Chronicle
64	L	+462, March 2	Hydatius, "Continuation of the Chronicle."
65	S	+464, July 20	Hydatius, "Continuation of the Chronicle."
66	S	+484, January 14	Death of Proclus, Marino of Naples, "The Life of Proclus," 37
67	S	+485, May 29	Gregory of Tours, History of the Franks, II, 1
68	S	+497, April 18	Gr Marcellinus, "Chronicle"
69	S	+512, June 29	Gr Marcellinus, Chronicle
70	S	+538, February 15	Beda, "Sec hist" 3.24, Ang-Sax Chron, 1.28, II, 14, etc.
71	S	+540, June 20	Beda, "Sec hist," V>, 24, etc.
72	S and L	+547, February 6 and August 17	Stephen's prediction of the eclipse, Cosmas Indicoplevst, "Christ. Topography."

73	S	+663, October 3	Gregory of Tours, "History of the Franks," IV, 31
74	L	+567, December 31	"Sangal Extracts."
75	L	+577, December 11	Gregory of Tours, "History of the Franks," V. 23
76	L	+581, April 5	the same, V, 41
77	L	+582, September 18	the same, VI, 21
78	S	+590, October 4	Maurice's campaign, Gregory of Tours, History of the Franks, X, 23, etc.
79	L	+590, October 18	Battle of R Vicinonia, Fredegar, Chronicle, IV, 11
80	S	+592, March 19	Fredegar, Chronicle, IV, 13

A detailed analysis of each of these eclipses requires, as has been demonstrated by the example of Thucydides' eclipses, a laborious and cumbersome study. Therefore, we will give just the basic facts and conclusions with precise references to the literature.

We will mainly be interested whether a given eclipse on its own allows for independent dating of a historical event, that is, whether the authority of astronomy

(considered the "exact science") confirms the dates recognized by the historical tradition.

A study of eclipses

Eclipse №1 ([16], pp. 167–169, [4], p. 427).

The source of information about this eclipse is an excerpt from the poet Archilochus, who allegedly lived some time in the 7th century B.C. The astronomical content is reduced to the statement of the fact of an eclipse. It is clear that we cannot speak about any dating by means of astronomy: the eclipse of 6/IV -647 is as good as any other eclipse, which occurred in this century. The claim that the indication of this eclipse, at least in some sense astronomically confirms the time of Archilochus' life is pure humor.

Morozov believes that this eclipse occurred in 305 A.D.

Eclipse №2 ([16], pp. 169–173. [4]. pp. 414–418).

Herodotus reports that Thales predicted this eclipse. Therefore, (see § 1) Herodotus' report is clearly apocryphal.

Herodotus reports just the bare fact of the eclipse. It is repeated by Pliny, dating it in four different ways, differing by sixty years.

The eclipse of Thales has been dealt with by many (Scaliger, Petavius. Calvisius, Stroeck, Bailey, Bozanne, Stackley, Meyer, Larcher, Escher, Volney, Ginzel, etc.). Almost every one of the researchers proposed a different eclipse (from the 19/V -556 eclipse to the 3/II -625 eclipse). The very abundance of solutions shows that astronomy cannot really say anything definite. It does not confirm traditional dating, just does not contradict it (as it should be whenever the characteristic details of an eclipse are unknown).

Morozov suggests that this eclipse occurred on 14/I 484 A.D.

Eclipse №3 ([16], pp. 173–174, [4], p. 419).

Xenophon just states the fact of a total eclipse in the area of the city of Larissa. The eclipse of 19/V -556 does not fit because its phase was 11 points only. Thus, astronomy refutes traditional dating here. Understanding this, Ginzel accompanies the date 19/V -556 with a question mark.

It is impossible to determine the true date purely astronomically due to a lack of information. Morozov, on the basis of some rather weak arguments, believes that the eclipses of 29/I 512 A.D., 15/II 538 A.D., and 25/V 1267 A.D. deserve attention.

Eclipses №4 and 5 ([16], pp. 174–177, [4], pp. 419–421).

Herodotus describes two eclipses, separated by a couple of years. On the former one, he reports just the fact of an eclipse, and on the latter that it was total ("from day to night") and occurred "before the beginning of the war." According to the traditional chronology, the second eclipse should be in -470. But there was no total solar eclipse in that year (and in the following years): the eclipse of 17/II -477, not to mention that its date differs from the traditional one, was partial. As for the first eclipse, as Ginzler notes, the phase of 7.32 of the eclipse of 2/X -479 is so small that it could hardly be observed without prior notice and recognized as an eclipse without a smudged glass. The first report of Herodotus taken separately could still be considered not contradictory to the astronomical data by some stretch, but in combination with the absence of the second eclipse, it should be recognized that astronomy refutes both reports of Herodotus.

Morozov argues that **there are only two pairs of eclipses matching Herodotus' description**: 5/XI 644 A.D., 21/VI 646 A.D., and 2/X 1084 A.D., 16/II 1086 A.D.

Eclipse №6 ([16], pp. 176 -177, [4]. pp. 421- 422 and 499-510).

We have already discussed this eclipse of Thucydides in detail in § 2. We remind you, that in combination with the other two eclipses (see below №№8 and 9) Thucydides' description unambiguously gives the eclipse 2/VIII 1133. Thus, astronomy here quite definitely refutes the traditional date.

Eclipse №7 ([16], p. 177 and [4], pp. 422–423).

This eclipse is described as follows by Aristophanes in his comedy "Clouds" (translation ed. by STR.Apta)

"And Selene forgot her usual way, her lantern.

Helios hid his lantern, disappearing from the sky and threatening,

That he will not shine if Cleo would rule."

In this transcription, it is unclear which eclipse is meant, a solar or lunar eclipse, or perhaps two eclipses are described here, both solar and lunar. However, the date is fairly accurate: according to the traditional chronology, Cleo was elected a strategist in 423.

Hoffmann believes it to be solar eclipse №8, allegedly described by Thucydides. Seyfarth considered it as a solar

eclipse of 8/VIII -421, but this eclipse was not visible in Athens. Ginzel adheres to the opinion of Calvisius that it is a lunar eclipse of 4/X -424. We leave it for the reader's judgment, whether in such a situation astronomy can be considered as at least not contradicting the traditional date.

By the way, to demonstrate with what impudence historians use astronomical data, we cite the commentary of V. Yarkho to these verses of Aristophanes:

"Aristophanes recalls a lunar eclipse in October of 425 and a solar eclipse in March of 424 when Cleo was elected strategist after his victory at Pilose" (see [90], p. 437).

After this doting "and" the reader is not having any doubt that the dating is in both cases reliably confirmed by astronomy!

Eclipses №8 and 9 ([161, pp. 178–179, [4], pp. 424–425 and 499–510).

These are Thucydides' second and third eclipses. As we already know, they actually occurred on 20/III 1140 and 28/VIII 1151.

It is believed that eclipse №9 is also described by Plutarch. If this is true, then consequently, Plutarch is also

apocryphal. However, Morozov suggested that Plutarch was referring to some other lunar eclipse.

Eclipse №10 ([16], p. 179, [4], p. 425).

Any evening lunar eclipse fits Xenophon's description. Nevertheless, the date 15/IV -405, proposed by Petavius, diverges by almost two years from the date indicated by Xenophon.

The same eclipse is reported by Diodorus at -405. Thus, the message of Diodorus is not rejected by astronomy, but, we emphasize again, it is not confirmed either because without a specific month and day it is possible to find a lunar eclipse in almost any decade.

Morozov believes that this is an eclipse of 26/X 375 AD or some other, later eclipse.

Eclipse №11 ([16], p. 179, [4], pp. 425–426).

Xenophon and Seneca report only the fact of the eclipse in 373 of the Olympic era, that is, -403 according to the traditional chronology. Thus, the astronomical data do not contradict the reports of Xenophon and Seneca.

Morozov, believing that the Olympic era matches A.D., (the grounds for this opinion will be discussed in a different place) points to the eclipse of 8/IX 378.

Eclipse №12 ([16], pp. 180–182, [4], p. 425).

Cicero reports that the eclipse occurred on June 7 (in the June Nones). The date 21/V -399, recognized by Ginzell, is based on an unverifiable calendar hypothesis. Holzapfel, based on another calendar hypothesis, gives the date 18/I -401.

Morozov suggests the date 6/VI 346 A.D.

Eclipse №13 ([16], p. 182, [4], pp. 427–428).

The eclipse was described by Xenophon as being partial. Plutarch and Diodorus also mentioned it allegedly. The latter indicates that it occurred in 386 of the Olympic era, i.e., in -389. Since no eclipse actually occurred in that year, Petavius proposed the nearest eclipse 14/VIII -393.

Morozov, based on his identification of the Olympic era as ours, proposes an eclipse of 15/IX 386.

Eclipse №14 ([16], pp. 182–183, [4], p. 428).

According to Diodorus and Plutarch, this eclipse occurred in 417 of the Olympic era, i.e., in -357. By giving it a

date of July 13, -363, Ginzel suggests that Diodorus and Plutarch were wrong by 6 years.

Morozov recalls that on 19/VII 418 A.D. there was a total solar eclipse, remarkable in many respects (№60).

Eclipse №15 ([16], p. 183, [4], pp. 428–430).

Finding a satisfying solar eclipse near the traditional date proved impossible. Accompanying the eclipse of 12/V -360 in his list with a question mark, Ginzel writes that his choice "is based only on the authority of Hoffmann."

One can almost certainly assert the apocryphal nature of Plutarch's report since he reports that Dion predicted this eclipse.

Morozov tends to identify it with eclipse №60.

Eclipse №16 ([16], p. 183, [4], p. 430).

Plutarch reports that the eclipse occurred before Dion's departure to fight Dionisius. The date 3/VII1 -356 is suggested by Calvisius. This is doubtful, firstly because this eclipse has a negligible phase of 2.3, and secondly, because, according to Diodorus, the sailing of the Dion occurred in 424 of the Olympic era, i.e., in -350.

Morozov notes that there was also a lunar eclipse on 21/III 423 A.D.

Eclipse №17 ([16], p. 184, [4], p. 431).

Titus Livy says that it was "night in the midst of the day." If he is really referring to a solar eclipse (by the context it could also be a volcanic eruption), the information is totally insufficient for any conclusions. Ginzel, therefore, accompanies the eclipse of 15/IV -339 with a question mark.

Morozov suggests that it may again be eclipse №60,

Eclipse №18 ([16], pp. 184–185, [4], pp. 431–432).

This lunar eclipse is mentioned by a number of authors (besides Plutarch and Arrian, also by Ptolemy, Pliny, and Curtius). It occurred in the second hour after sunset or after midnight. The eclipse of 20/IX -330 (indicated by Scaliger) was, however, at the fourth hour after sunset.

Morozov believes that it was the eclipse of 18/VI 224, which at least occurred in the second hour after midnight.

Eclipse №19 ([16], pp. 185–187, [4], p. 432).

Diodorus and Justin state only the fact of a total eclipse in the western Mediterranean Sea. The choice of the eclipse

of 15/VIII -309, proposed by Scaliger and Petavius, is completely arbitrary from the astronomical viewpoint.

Eclipse №20 ([16], p. 187, [4], p. 433).

Livy writes only "of miraculous apparitions." It is doubtful that he was referring to an eclipse. The date 7/XI -295 is suggested by Calvisius, and the date 24/III -293 by Zeifarth.

Eclipse №21 ([16], pp. 187–188, [4], pp. 433–434).

Polybius reports only the sole fact of the lunar eclipse. The date 20/III -218, accepted by Ginzler, is suggested by Petavius. Scaliger considered it an eclipse of 1/IX -217.

Eclipses №№22 and 23 ([16], p. 188. [4].pp. 434–435 and [5]. pp. 283–289).

The dating of these eclipses is facilitated by the fact that, according to Livy, they form a pair separated by about 11–13 years. The Petavius' solutions of 11/II -216 and 6/V -202 satisfy these conditions. However, astronomically other solutions are also possible. Morozov indicates a pair (17/III 443, 24/II 453), adding that it fits Livy's description better because two years before the eclipse №23 Livy reports a comet, and in 450 A.D. there indeed was one of the returns of

the famous Halley's Comet. However, it is possible that Livy describes some non-periodic comet, and then other pairs become possible.

Eclipse №24 ([16], p. 89, [4], pp. 435–436).

Only the fact of the eclipse is reported by author Zonaras in the 12th century and also by Josephus Flavius, who obviously used Zonaras as a primary source (which, by the way, once again independently points to the falsity of Flavius' work). Once again, astronomy cannot say anything definite about the date. Ginzler doubted the date of 19/X -201, suggested by Seyfarth because this eclipse had a low phase of 3.2 and could hardly be seen without prior warning and smudged glass.

Morozov suggests an eclipse on 20/VIII 472 A.D.

Eclipse №25 ([16], pp. 189–190, [4], pp. 436–437).

We have discussed this eclipse in detail in § 4. We remind the reader, that our date for this eclipse is 10/VII 967.

Eclipse №26 ([16], p. 190, [4], pp. 436–437).

Livy writes very vaguely: "in the afternoon... darkness appeared" and indicates the time about two years after the eclipse №25. Accepting that the latter occurred on 10/VII

967, a date of 8/V 970 may be suggested for eclipse №26 (if it is indeed an eclipse).

Eclipse №27 ([16], pp. 190–192, [4]. pp. 437–439).

This is the lunar eclipse predicted by Sulpicius Gallus (see §4). Our date is 5/IX 955. However, Morozov is more likely to prefer the date 5/IV 415

Ginzel thinks that the same eclipse is described by Plutarch and Polybius (as well as Cicero, Pliny. Quintilian, Valerius Maximus, and Frontinus Strategus). However, the details of Plutarch's and Livy's descriptions diverge. If this is some other eclipse, it can rightly be attributed to almost any year.

Eclipses №№28 and 29 ([16], p. 192, [4], pp. 440- 441).

Under these two numbers, Ginzel refers to Obsequens's description of three different eclipses, separated by 10 and 34 years, respectively. The date 19/VII -103 for the first of these eclipses is suggested by Riccioli. However, the other two eclipses of Obsequens are not present in years -93 and -59. Therefore, Ginzel had no choice but to declare these eclipses "doubtful" and give them no date.

Morozov argues that from the early A.D. to the 15th century **only one triad of solar eclipses is present, visible in the Mediterranean region, separated by intervals of 10 years, and 34 years**, namely, the triad of 4/III 349, 15/III 359, 20/XI 393.

Eclipse №30 ([16], p. 193, [4], pp. 377–378).

Described by Cicero and allegedly occurred during his consulate in -62. The date 3/V -42 is suggested by Goldapfel, Unger and Soltau. This eclipse was at moonset in the morning, while Cicero clearly says "in the middle of the night." For the same reason, the evening eclipse of 27/X -62, proposed by Stroeck and Zeifart, does not fit. The nearest night eclipse (proposed by Calvisius earlier) was 7/XI -63 - a year ahead of schedule. Thus, here astronomy definitely refutes the report of Cicero.

Morozov is likely to prefer the date 19/IV 292.

Eclipse №31 ([16], pp. 93–95).

Under this number, Ginzell collected numerous reports of solar eclipses, which he was unable to date astronomically.

Dio Cassius describes a total solar eclipse at Pompey's departure for Dyrrhachium. Petavius, for lack of a better one,

identified it with a partial eclipse 7/III -50. Morozov believes that this eclipse occurred on 3/III 325 (see [4], p. 378).

Lucan reports on the eclipse at Caesar's crossing of the Rubicon. Since there was no eclipse in -48, to which historians attribute this event, Heis proposed considering (?!) it an eclipse of 7/III -50. Morozov suggests that this eclipse occurred on 10/V 305 (see [4], pp. 378–379).

Virgil, Ovid, Tibullus, Aurelius, Victor, and Plutarch report on the eclipse on the day Julius Caesar was killed. It is also mentioned by Josephus Flavius, Cedrenius, and Servius. Despite this abundance of reports, astronomy maintains that neither in -44 when Caesar was allegedly killed nor in neighboring years was there any solar eclipse in Rome or its vicinity. Hence, Ginzel calls it "doubtful."

Morozov suggests that Julius Caesar is written off from Constantius Chlorus, in the year of whose death there was indeed a spectacular eclipse on 21/VII 306 (see [4], pp. 379–381).

Ginzel also discusses two eclipses described in the so-called Easter Chronicle (an early medieval compilation compiled from unknown sources). The descriptions are quite confusing and dark. Stroeck ventured to suggest eclipses of

19/V -35 and 20/VIII -30, completely inappropriate for many reasons (see [4], pp. 396–398).

Eclipse №32 ([16], pp. 195–196, [4], pp. 381–383).

This eclipse is described by Josephus Flavius as occurring before the Passover shortly before Herod's death. Since this eclipse is critical for dating the time of Jesus' birth, much attention has been given to it. The date 3/III -3 is given by Petavius and Kepler as the time of the only suitable lunar eclipse around the beginning of our era. On this and only on this basis rests the opinion, generally accepted by theologians of the "rational school" that Jesus Christ was born at least 5 years before his official birth. However, this eclipse had a negligible phase of 4.4 and was almost a month before Easter. Therefore, many scholars reject the Petavius-Kepler date and believe that Flavius erroneously (!) connected it with Easter. On this basis, Riccioli suggests a date of 29/XII 1 B.C., Hind suggests a date of 9/I of the same year, and Stockwell - even 15/IX 4 A.D. From the very set of these decisions, it is clear that none of them correspond to all the circumstances of the case.

Morozov believes that the eclipse in question here is 31/V 337.

Eclipse №33 ([16], pp. 196–197, [4], p. 383).

This eclipse is described by Dio Cassius as being partial. The date 28/III 5, consistent with the traditional chronology, is suggested by Petavius, Riccioli, and Stroeck. Seyfarth proposes an eclipse of 6/II 7, inconsistent with tradition.

Morozov proposes an eclipse of 6/VIII 324.

Eclipse №34 ([16], pp. 197- 198, [4], pp. 383- 385).

The eclipse is attributed by Tacitus and Dio Cassius to the death of Octavian, which occurred allegedly on 18/VIII 14. The eclipse of 27/IV 14 is suggested by Petavius and Scaliger. As always for lunar eclipses, astronomy can offer a host of other solutions.

Morozov believes that the eclipse in question here is the eclipse of 31/V 337.

Eclipse №35 ([16], pp. 198- 200, [4], pp. 385–388).

The eclipse is described by Eusebius as occurring on the day of Christ's execution, According to him, it was a total solar eclipse occurring on the full moon. Riccioli speaks directly, therefore, of the "miraculous character" of this eclipse (a reminder that, according to the laws of nature, solar eclipses are only possible during a new moon). The date 24/XI 29 is

suggested by Wurm, Ginzel, and Hoffmann, who believe (disregarding the direct indications of Eusebius) that this eclipse occurred several years before the crucifixion.

Eclipse №36 ([16], pp. 200 -201, [4], p. 388).

This is the same eclipse as №35 but interpreted, according to the Gospels, as a lunar eclipse. The date 3/IV 33 is suggested by Riccioli. Ginzel, having calculated its phase, showed that it was not visible in Jerusalem.

Eclipse №37 ([16], p. 201, [4], pp. 388–389).

Dio Cassius writes that this eclipse was predicted in advance and, moreover, its exact time and maximum phase were calculated in advance. The date, 1/VIII 45, was suggested by Petavius. Ginzel, having calculated its phase, noted that it was hardly visible in Rome. In view of the precalculated nature of the eclipse, this is clearly apocryphal.

Eclipse №38 ([16], p. 201, [4], pp. 389–390).

Aurelius Victor describes it as partial. Dion and Seneca, saying nothing about the eclipse, allow us to impose Victor's report on the traditional timeline sometime between 46–47 A.D. As always for lunar eclipses, astronomy is powerless to

say anything definite. The presence of the 1/I 47 eclipse neither confirms nor disproves the traditional date.

Eclipse №39 ([16]. pp. 201–202, [4], pp. 390–394).

Besides Pliny, Dion and Tacitus also write about the eclipse. It is thought that all three refer to the same eclipse. The date 30/IV 59 was suggested by Riccioli, Stroeck and Cech. But that was a partial eclipse, whereas Dion definitely speaks of a total eclipse.

Dio Cassius mentions another total lunar eclipse, which Ginzel considers "very doubtful." Hoffmann suggested the eclipse of 18/X 69, which is partial.

Eclipse №40 ([16], pp. 202–204. [4], pp. 392–393).

Plutarch characterizes this total solar eclipse as being after noon and "recent". The eclipse of 20/III 71 was suggested by Stroeck. But it was in the morning and 50 years before Plutarch's traditional date of death. Kepler's proposed eclipse of 1/VI 113 was also in the morning.

Morozov suggested that it could be the eclipse of 19/VII 418.

Eclipse №41 ([16], pp. 204-205, [4], pp. 394-396).

Pliny reports solar and lunar eclipses, separated by fifteen days, occurring during Vespasian. The pair indicated by Ginzel (and before him by Zechs) fit Pliny's description perfectly. Morozov notes that other pairs can also be found in other epochs, so astronomy alone does not provide an unambiguous solution even in this case. He points in particular to the pair of 18/VIII 388 and 2/IX 388.

Ginzel also discusses a partial solar eclipse that occurred, according to Pseudo-Victorus, on the day of Nerva's death. Calvisius considered it an eclipse on 21/III 98. But it had such a low phase of 3.5 that it would hardly be noticed at all. In addition, the death of Nerva is attributed to 17/I 98, two months before the eclipse. Therefore, Ginzel believes that the report of Pseudo-Victor is not confirmed by astronomy.

Eclipse №42 ([16], pp. 205-206, [4]. pp. 398-399).

Lampridius says only that "a sudden fog and gloom appeared about the January calendas". Stroeck, believing that an eclipse is described here, gives Ginzel's date. In reality, of course, astronomy can't say anything definite here.

Eclipse №43 ([16], p. 206, [4], pp. 399-400).

At the time of the eclipse of 3/VI 197, the Sun was in the constellation Gemini, while Tertullian definitely states that at the time of the eclipse, the Sun was in the constellation Leo. Ginzel is forced to ignore this contradiction because there was no eclipse in Leo from 176 to 212.

Morozov suggests an eclipse of 20/VIII 472.

Eclipse №44 ([16], pp. 206-207, [4], pp. 401-403).

The eclipse is described by Dio Cassius. The date 7/X 218 is suggested by Hoffmann. Morozov writes: "It seems to me that a better match is difficult to find", pointing out that the next suitable eclipse was much later 29/VII 512. Thus, a purely astronomical choice is also impossible here.

Eclipse №45 ([16], p. 207, [4], pp. 403-404).

Julius Capitolinus states that this eclipse was total and occurred under the emperor Gordian, who ruled, according to historical tradition, from 238 to 244. However, during that period (and even during the whole third century) Rome saw one eclipse, and that was partial (occurring on the date of 5/VIII of 240) indicated by Ginzel. Therefore, Ginzel accompanies this eclipse in his list with a question mark and

believes that the Capitolian's testimony is astronomically unsupported.

Morozov points to the eclipse of 20/VI 540.

Eclipse №46 ([16], pp. 207-208, [4], pp. 342-343).

The eclipse is described in the Consularia of Constantinople, known as "the first European chronicle." In reality, this chronicle has not reached us. The Paschal Chronicle and the Hydatius Chronicle state that records of remarkable events were kept in Italy even before Constantine's time and that they lasted until the death of Theodosius I in 395. One copy of these chronicles made it to Spain, where extracts from it were retold by Hydatius and he continued the chronicle further. Excerpts from these chronicles are also quoted by the Easter Chronicle, describing events up to 630. In the 19th century, the famous historian Mommsen selected all such references from the Easter Chronicle and the Hydatius Chronicle and "reconstructed" the original Consularia from these bits and pieces. As Morozov writes, "...despite all Mommsen's authority, the scientific value of such an extract cannot be great since the reports of later authors (unscrupulous contemporary medieval authors

especially) cannot have the authenticity of a primary source..." ([4], p. 342).

This general conclusion is also confirmed for the eclipse in question. The Consularias indicate 291 A.D. for it, in which there were no eclipses. The date 4/V 292 is given by Sick, and Petavius and Stroeck consider it to be the eclipse of 15/V 298. Morozov notes that one could with the same right take, say, the eclipse of 3/III 295.

Eclipse №47 ([16], p. 208, [4], pp. 346-948).

The eclipse is described in the hagiography of St. Felix as occurring on the night of 31/VIII 303. The nearest lunar eclipse of 31/VIII 304, indicated by Ginzel, occurred one year and one day later. Again, with the assumption of temporal shifts, astronomy proves nothing, and without this assumption, it refutes the report. Ginzel accompanies this eclipse with a question mark.

Eclipse №48 ([16], pp. 208-209. [4], pp. 348-349).

Aurelius Victor describes the "corruption" of the Sun under Emperor Licinius on the Epiphany (i.e., January 6). Petavius gave the date 20/XII 317, and Stroeck and Seyfarth gave the date 31/XII 316. Later, it turned out that these

eclipses were invisible in the Mediterranean area. Hence, Ginzel, ignoring the reference to the day of the Epiphany, accepts the date 16/VII 316, though he accompanies it with two question marks. Morozov rightly writes, "But acting so violently with the text, one can prove anything". He emphasizes that the only "epiphanial" eclipse visible in Europe after A.D. occurred much later in 1163.

Eclipse №49 ([16], p. 209, [4], p. 344).

This is the second mention of eclipses in the *Consularia* of Constantinople. According to the *Consularias*, it occurred in 318. In fact, there were no eclipses at all that year, and the nearest eclipses of 6/VII 316 and 20/XII 317, suggested, respectively, by Petavius and Zeifart, were poorly visible (or not visible at all) in the south of Europe. The date 6/V 319, indicated by Ginzel, is suggested by Strain. However, this eclipse was in Rome at sunset, whereas the *Consularia* give it the time "at nine o'clock in the afternoon." (It is believed that the Romans of that era used a "day" clock, i.e., the sunset corresponded to 12 o'clock.)

Eclipse №50 ([16], pp. 209–210, [4], pp. 350–351).

This eclipse is reported not only by Hamartol but also by George Monk and Kedrenos. It is characterized as total. On the other hand, the eclipse indicated by Ginzel on 6/VIII 324 was partial with a half phase of 6.8. "One must admit," writes Morozov, "that the 'Hamartol chronicle' is not a primary document, but, like the chronicle of George Monk and the historical compilation of Kedrenos, belongs to the late Middle Ages or even to the Renaissance."

Eclipse №51 ([16]. p. 210, [4], pp. 350 and 351–352).

The Sicilian astrologer Firmicus says that this eclipse was "wisely foreseen by the attention of some mathematicians" (!?). The date of 17/VII 334 is suggested by Petavius. That is a circular eclipse, although, as far as can be understood from the rather inarticulate text, Firmicus considers it total. Ginzel is inclined to believe that this eclipse coincides with eclipse №50.

Eclipses №№52 and 53 ([16]. pp. 211–212. [41, pp. 352–354).

The eclipses are described by Theophanes (an author of the 9th century), and the first eclipse is also described by Bl.

Jerome, Cassiodorus, and Cedrenos. Judging from the text, the interval between eclipses is approximately equal to a year. The first eclipse was total, and the second occurred on Sunday morning. As there were no such eclipses in that year, Petavius, supposing a shift of 8 years, suggests the eclipses of 6/VI 346 and 9/X 348, indicated in Ginzel's table. As Morozov notes, no other pairs of eclipses with the properties indicated by Theophanes exist in the interval from the beginning of our era to this day. Therefore, we must admit that here astronomy agrees with history, correcting it by 8 years.

It is interesting, notes Morozov, that Cassiodorus, and Bl. Jerome gives for the first eclipse almost correct year 348, and Cedrenos (in the XII century!) gives an even more exact date - 347. The most interesting is that some allegedly late and compilative chronicles going back to Jerome and Theophanes and usually considered unreliable, give the correct year 346! How this happened can only be guessed.

Eclipse №54 ([16], pp. 212–213, [4], pp. 354–355).

The eclipse of 28/VIII 360 is suggested by Petavius, but it does not agree well with Ammian's description and has a phase of 2.8 which is too low. So Stockwell proposed an eclipse on 9/X 348, but it, too, fits poorly.

Eclipse №55 ([16] p. 216, [4], pp. 356–360).

This is the first eclipse described by an astronomical scientist, with the exact date, hour, and duration of the eclipse. It is important to the clarification of some calendar eras, and we will return to this. The eclipse of 16/VI 364 indicated by Cech differs only in minutes from that described by Theon (but only if we accept a certain cunning calendar hypothesis; otherwise Theon's eclipse will fall on 22/VI 1126). Until final clarification, we can assume that modern astronomical science confirms this eclipse.

Eclipse №56 ([16] pp. 211–214, [4], pp. 345–346).

This eclipse is described in the "Italian Consularia," which is, like the "Constantinople," an artificial product. They were "reconstructed" by Holder-Egger from quotations in the chronicles. The same eclipse is described in the Chronicle of Marcellinus. However, there was no eclipse at the time indicated in these writings. The date 20/XI 393 was found by Petavius and Calvius with the assumption that Marcellinus made a mistake.

Morozov believes that this is a later insertion made by a medieval scholar who tried but naturally failed to calculate the eclipse of 20/XI 385.

Eclipse №57 ([16], pp. 214–215, [4], pp. 362–365).

This eclipse is mentioned in the speech of Bl. Jerome's "Against John," which is a specimen of ecclesiastical eloquence, clearly of a later period, as occurring around Pentecost (i.e. between May 10 and June 14). Stroeck considers this eclipse to have occurred on 6/IV 395, and Seyfarth - that on 7/VI 392, 20 days after Pentecost. Ginzel's date of 3/VII 400 is also far from Pentecost. Therefore, Ginzel suggests that perhaps, Jerome made a typo, and instead of the lunar eclipse he wrote "solar" (!). However, the lunar eclipse of 1/VI of 402 that he discovered is a week removed from Pentecost.

Morozov emphasizes that up to 1621, no eclipses visible in Europe around the Pentecost were ever recorded. Thus, if the report about the eclipse is not some pure fantasy, then we should inevitably consider Jerome's speech to be very late apocrypha (which fully matches its tone and language).

Eclipse №58 ([16], pp. 215–216. [4], pp. 365–366).

Claudian describes this eclipse in his poem "On the Battle of Pollentino". This battle allegedly occurred in 403. However, that year, how ill luck, there were no lunar eclipses, although there had been five in the three preceding years. Because of

the multiplicity of these eclipses, it is difficult to pick any particular date.

Eclipse №59 ([16], pp. 216–217, [4]. pp. 311–314).

The eclipse is described in the Chronicle by Hydatius under 400, in the Consularia of Constantinople under 402, and in the Chronicle of Gaul under 403. It is indicated that the eclipse occurred on Tuesday, November 11. Ginzel believes that this is the same eclipse, turned into a whole nest because of the inaccurate dating of the year. A check in the Oppolzer Canon shows that in the interval before 1500, the solar eclipse visible in Europe on November 11 was only in 402 and 421. Since November 11 was Tuesday in 402 and Friday in 421, we can assume that astronomy fully confirms the reports of these chronicles.

Note that this is the first reliable astronomical confirmation of the traditional date.

Eclipse №60 ([16], pp. 217–218, [4], pp. 314–317).

In Philostorgius, we find such a detailed description of the total eclipse that only an eyewitness could have made then. It is also described in detail in the "Paschal Chronicle," the "Chronicle" by Hydatius, the "Chronicle of Galles" and the

"Chronicles of ancient chronography." There is no slightest doubt that these descriptions refer to the eclipse of 19/VII 418.

Eclipse №61 ([16], p. 219, [4], pp. 318–319).

The eclipse of 23/XII 447 is the only one that fits the description in the "Chronicle" by Hydatius.

Eclipse №62 ([16], p. 219, [4], pp. 319–320).

The description of this lunar eclipse does not contradict the astronomical data, although in relation to the lunar eclipse it is not a godsend surprise, but still nice.

Eclipses №№63 and 64 ([16], p. 221, [4], pp. 320–322).

Both of these eclipses are largely confirmed by astronomy.

Eclipse №65 ([16]. p. 222, [4]. pp. 323–324).

The eclipse of 20/VII 464 fits by all accounts. Morozov calls it "doubtful" because he has found another candidate - the eclipse of 20/VII 483. But apparently, he does it in vain, as the eclipse of 483 could not be seen in Europe.

Eclipse №66 ([16], p. 222, [4], pp..323-324).

A description of the eclipse is contained in the biography of Proclus, belonging to the pen of his pupil Marino. The eclipse of 14/I 484, suggested by Reiner and Riccini, is quite consistent with Marino's description. Marino mentions a predicted eclipse two years after that. That one is also there (19/V 486).

Eclipse №67 ([16], pp. 222–223, [4], p.326).

The eclipse is also described by Gregory of Tours in the so-called "Easter Campanum." "Campanum" gives the date of 485, on the July calendas (in Latin - "INK.IVL"), i.e. July 1. But on July 1, solar eclipses in the Mediterranean region were in 56, 558, and 1079 only. Stroeck thinks (and Ginzel and Morozov quite agree) that the copyist was mistaken when copying the manuscript, and that the original was "IVK.IVN", i.e. "IV day before the June calendas" (May 29). And really, on 29/V 485, a solar eclipse passed through Europe, having a phase of 9.7 in Clermont (where Gregory lived). Thus, with a certain caveat, we can consider the message of Gregory of Tours astronomically confirmed.

Eclipse №68 ([16], p. 223, [4], pp. 326–327).

Marcellinus dates this eclipse confusingly, giving two dates: 496 and 497. Both the first and second years had solar eclipses, but with little phase. Ginzel prefers (following Stroeck) the eclipse of 497 because it had a larger phase. Since Marcellinus does not specify a day, astronomy really can't say anything definite, and the claim of astronomical confirmation of Marcellinus' report is pure fiction.

Eclipse №69 ([16], p. 223, [4], p. 327).

The message about this eclipse does not contradict astronomical data.

Eclipse №70 ([16], pp. 223–224, [4], pp. 327–328).

Assuming a one-day shift, all reports of this partial eclipse are perfectly confirmed.

Eclipse №71 ([16], pp. 224–225, [4].pp. 328–330).

This total eclipse is confirmed by allowing minor corrections to the dates given in the sources.

Ginzel points to another source ("Sangal Extracts," compiled by de Rossi in 1867). The description of the eclipse in these "Extracts" is confusing and contradictory. Ginzel

accompanies it with a question mark and practically ignores it. Morozov thinks ([4]. pp. 330- 331) that this report may refer to the eclipse of 29/IV 534.

Eclipse №72 ([16], p. 225, [4]. pp. 331–333).

The eclipses are indicated by Krall and are quite consistent with the description of Indicoplevst. Nevertheless, there is a disturbing element: Indicoplevst reports that the eclipses were predicted in advance. It is difficult to say what this is without special research. Perhaps Indicoplevst is simply fantasizing to amaze the imagination of the reader, or maybe the solar eclipse was actually predicted from saros.

Eclipse №73 ([16], pp. 225 -226, [4], p. 333).

The date of the eclipse 3/X 563 diverges from the date 1/X 563, indicated by Gregory. However, Gregory reports that there was a comet in the sky this year. This again is inaccurate - the comet was in 565. The opinion of Morozov: "...a match of the eclipse and comet, it seems to me, excludes the possibility of any other date. Probably the record was not made immediately, but later, from memories." Whatever it actually was, we must admit that here the astronomical confirmation occurs only by a great stretch.

Eclipse №74 ([16], p. 226, [4], pp. 333–334).

The lunar eclipse actually occurred on the day and year indicated in the "Extracts." Nothing more can astronomy claim.

Eclipses №№75–77 ([16], pp. 226–227, [4], pp. 334–335).

The year of the second eclipse is given by Gregory by error. Since there is no reason to doubt the authenticity of Gregory's composition (language, style, and orthography definitely point to the early Middle Ages), we can consider the messages of Gregory astronomically confirmed with the proviso that, apparently, Gregory did not observe these eclipses himself but used messages of others (or recorded them later, from memory).

Eclipse №№78 ([16], pp. 227–228, [4], pp. 335–337).

Of all sources, only Gregory reports the month in which the eclipse occurred, and apparently, he does even that incorrectly. Contrary to the opinion of Morozov (and traditional historians), we cannot assume that astronomy has confirmed the authenticity of the sources here. This is still a case where astronomy alone cannot say anything definite.

Eclipses №№79 and 80 ([16], p. 228, [4], pp. 337- 338).

For this pair of eclipses, Fredegar does not specify either a month or day. Therefore, the situation here is the same as with the previous eclipse.

Conclusion

About 90 (89 actually) eclipse reports total were reviewed. In five of them (№№17, 20, 26, 34, 35) it is possible to doubt whether they are about eclipses at all. Therefore, we will exclude them from our analysis. We also exclude the "miraculous" eclipse №35, the vaguely described eclipse №7, the eclipse №12 that requires additional hypotheses, the confusing eclipse №71, and eclipse №1 that gives no information.

We will divide the remaining 79 eclipses into four groups:

Group I. In this group, consisting of 23 eclipses, we will include eclipse №2, Diodorus' eclipse №10, eclipses №11, 19, 21-23, 33, 34, 38, two eclipses of №41, eclipses №№44, 62, 68, 69, 74-80. The description of these eclipses allows for

many astronomical solutions, but among these solutions, there is an eclipse falling on a traditional date. Thus, **astronomy does not contradict traditional history here**, although we cannot say that it confirms it.

Note that, as it is natural to expect, nearly half of the eclipses in this group are lunar.

Group II. In this group, consisting of 30 eclipses, we include eclipses №№3–5, the eclipse of Xenophon from №10, eclipses №№13–16, 18,24,30, all five eclipses from №31, eclipses №№32,36,37,39, the last eclipse from №41, eclipses №№43,45-47,49-51,54,58. The description of these eclipses also allows for many astronomical solutions, but among these solutions, there is no eclipse that occurred on the traditional date. The eclipses indicated by Ginzel either have astronomical characteristics that contradict the description or occurred at a time differing from the traditional date for at least two years. There are, however, only three eclipses of the latter kind (eclipse of Xenophon from №10, deviating by two years, eclipse №13, deviating by 4 years, and eclipse №14, deviating by 6 years); therefore, their inclusion in the first group would only slightly change the statistics.

For eclipses in this group, **astronomy should be considered refuting traditional dates** (and the reliability of sources) or, at best, not contradicting them by a great stretch only.

Discussing eclipses of the first and second groups, we have generally cited Morozov's opinions on when these eclipses actually occurred. We emphasize that these opinions are usually based not on astronomy but on his other considerations, which we will expound on and discuss in a different place. For now, we wish only to point out that these considerations are thus not rejected by astronomy (but also confirmed just as much as traditional dating).

Group III. In this group, consisting of 10 eclipses, we shall refer to eclipses №№6, 8, 9, 25, 27, 28, both eclipses №29, eclipses №№48 and 57. The descriptions of these eclipses allow for the only way to find a satisfying eclipse, which turns out to be **a much later one**. Here, astronomy rejects the traditional dates unquestioningly, proving the later origin of the sources.

Group IV. To this group, we attribute eclipses, like eclipses of the third group, unambiguously characterized by

their description in the source, but falling on the traditional dates. Undoubtedly eclipses №№59–61, 63–65, and one eclipse №66 belong to this group. They also seem to include eclipses №№52. 53, 55, 67, 70, both eclipses №72 and, perhaps, eclipse №73, Thus, there are 16 eclipses in total in this group. **These and only these eclipses can be considered as astronomically confirming the traditional dates.**

It is immediately striking that eclipses of the fourth group appeared since the 4th century only! So it makes sense to separately count eclipses up to №55, which occurred (according to traditional views) before the middle of the IV century, and eclipses with greater numbers.

Group	Before the middle 4 th century A.D.		After the middle 4 th century A.D.	
	Number	Percentage	Number	Percentage
I	13	25%	10	35%
II	29	57%	1	4%
III	91	8%	1	4%
IV	18	10%	16	57%
Total	51	100%	28	100%

Percentages are rounded.

We can see that **until the middle 4th century A.D.** (and thus also in antiquity) **there is not a single eclipse reliably confirming the traditional date.** Most eclipses (75%) are rejected by astronomical data, and only a quarter of all eclipses do not contradict it.

In contrast, **after the 4th century, more than half of the eclipse descriptions confirm the traditional date,** more than 1/3 do not contradict them, and only a measly 8% (actually only 7%, the discrepancy is due to rounding errors) are refuted by astronomy. Let us also note that half of the eclipses of the first group after the 4th century comes from the same, obviously careless, and not very authoritative source (Gregory of Tours). Without it, the distinction between the two classes of eclipses would be even more striking.

This statistic unequivocally points to the apocryphal nature of all descriptions of eclipses prior to the 4th century A.D. It cannot be explained in any other way.

Opinion of Robert Newton

Recently, ancient eclipses were studied anew by **Robert Newton**, who has examined not only ancient but also medieval eclipses. We will not expound on his studies in detail but will give only one quotation summarizing his research.

"We can use ancient astronomical data for chronological purposes, but with some limitations. *An abnormally large number* of ancient records are either false or contain errors greater than would be expected on the basis of the technical capabilities of the time.

These texts are often erroneous on a serious scale, even in terms of the calendar system used by the observer. Of the approximately 700 records of solar eclipses, the year is wrong in about one in four records. This error can be as much as 550 years (! - *Auth.*). In addition, at least ten cases of dating are so ugly that we cannot even tell which eclipse is meant. These records are particularly dangerous. We have managed to discover that they cannot be identified for the simple reason that we know the chronological system used in their dating. If we did not know the system, we might not know that these

data were distorted, and this could easily lead us to false identifications" ([83], p. 115).

Robert Newton, believing the traditional chronological grid piously, does not even raise the question of the cause of all these effects. For example, where could an error of 550 years come from?

It is surprising that neither does he notice the paradoxical situation when additional knowledge (in this case, knowledge of the calendar system used by the chronicler) does not help but, on the contrary, hinders the identification of eclipses. Isn't this "knowledge" simply false?

§ 6. Herodotus and his "History"

We will use the latest Russian edition of the "History" of Herodotus, made by G.A. Stratanovsky and supplied with commentaries by professor V. G. Boruchovich (see [44]). The analysis set forth in this paragraph belongs mainly to I.A. Volodin.

Manuscripts of Herodotus

From the commentary in [44], we learn first of all, that the manuscript of the "History in nine books" of Herodotus was found as late as the 15th century A.D. when after the capture of Constantinople by the Turks in 1453, these documents were exported to Western Europe. Various versions of this text (i.e., various manuscripts) are now preserved in libraries in Rome, Florence, Milano, Madrid, Paris, Oxford, Cambridge, Heidelberg, and other cities (see [44], p. 500). The number of these variants is quite considerable; thus, the edition of G. Stein (Berlin, 1869–1881) counts 46 manuscripts. The variants contained in them mostly affect the dialectal features of the text, and sometimes reflect variants with semantic meaning. Through the processing of these variants, the original text of the "History" was reconstructed.

These manuscripts are considered heirs to a "continuous historical tradition," which, historians have suggested, is that they were rewritten by inquisitive scribes over many centuries. Extant manuscripts are considered *to be written no earlier than the 10th century A.D.* (see [44], p. 500). Documents relating to the "History" before the 10th century do not exist. The desire to obtain such documents led to the discovery of papyrus passages by Herodotus early this century, which were instantly attributed to the ancient era and "dated" as I-II centuries A.D. These passages contain chapters 115–116 of the book (see references to publications in [44], p. 500).

Historians' treatment of Herodotus

The attitude of historians toward the work of Herodotus has always been very controversial. The great variety of information, referring to the most different areas of life in human society, the artistry of presentation, the abundance of fables and anecdotes, and fantastic details, - "very early all this brought on Herodotus the charge of distorting the truth" ([44], p. 494).

Even the "ancient authors" did not trust Herodotus. For example, Ctesias accused Herodotus of mendacity (see [44], p. 494). A skeptical attitude toward Herodotus is noticeable in Strabo; Diodorus left intense remarks about Herodotus (see [44], p. 94). Plutarch was particularly irreconcilable, accusing Herodotus of lacking elementary "human virtues." Plutarch even wrote a special treatise "On Malice of the Herodotus."

During the Renaissance, the Latin translation of Herodotus by the famous Lorenzo Valla (Venice, 1479) and the edition of the Greek text by the equally famous Aldus Manutius drew attention to the "father of history." The great French philologist Etienne (Stephanus) published his "Apology for Herodotus" in Geneva in 1566, but "a critical and often hostile attitude toward the first historian of Europe could be felt quite often until the late 19th century" ([44], p. 495).

Prof. Boruchovich defends Herodotus vehemently. "From Herodotus was demanded what he could not give beforehand due to objective reasons... At the level of source study and criticism of those times, the universal encyclopedic history created by Herodotus could only absorb, along with

the actual facts, many folkloric stories... Approaching Herodotus from the viewpoint of modern European science, the fastidious (? - *Auth.*) critics turned him either into a diligent, but unscrupulous compiler, or simply into an unscrupulous author, deliberately misleading the reader by telling about his imaginary travels" ([44], p. 496).

Here Borukhovich is referring to the famous researcher of Herodotus, Seuss, whose book, published in 1883, caused quite a stir in its time. According to B.G. Borukhovich, Seuss undeservedly(!) "accused Herodotus of deliberate deception of his readers with stories about journeys he did not undertake and facts that could not have taken place" ([44] p. 496).

We foolishly thought that writing about journeys that one did not undertake, and facts that could not have taken place - means deceiving the reader indeed. In the logic of Prof. Boruchovich, the travels of the notorious Sir John Mandeville would turn out to be quite a credible source. As they say, let God save us from such friends, and we will get rid of our enemies!

The comparison of Herodotus with John Mandeville is not accidental: "Comparative literary studies in the early XX century contributed to the evaluation of Herodotus as a Boccaccio-type novelist, a master of the artistic narrative" ([44], p. 496). "From an artistic point of view, Herodotus' style is commonly referred to as the novelistic style. A historical fact, folklore, legend, fairytale or even a fable could take the form of a novel" ([44], p. 472). L. J. Lurie even called the story of Xerxes and his brother Masiste a "spooky novel" ([44], p. 473).

"Herodotus was seriously attacked as a military historian, but his inexperience in military affairs was greatly exaggerated by his critics" ([44], p. 497).

The reader may think that this "recovery of the good name of Herodotus" is based on some newly discovered materials and documents. But no, we read further:

"Of course, he cannot in any way compare with Thucydides, who was a military man by profession, but it cannot be claimed (? - *Auth.*) that Herodotus knew absolutely neither tactics nor strategy. The work of Gandhi, Cromeyer, and others, who managed to take into account the purely

technical difficulties that Herodotus faced as a military historian, as well as the imperfect sources he used, have restored his credibility in this respect as well. Especially important is the work of Hignett, who has defended Herodotus against a number of accusations of bad faith" ([44], p. 497).

So, no new documents were added, but it was enough "to take into account purely technical difficulties" to prove the truth of Herodotus' assertions. Let us see further if they can still inform us of any documents on whose basis Herodotus is dismissed from the rank of the "Boccaccio-type novelist". On the criticism of Herodotus, Meirs spoke out:

"Two generations ago scholars argued, on the basis of Herodotus' omissions and errors, that his information was based on gossip and hearsay, as well as the writings of other travelers, his usual reticence about the sources which he drew his information from was explained as deliberate plagiarism (how else to explain it? – *Auth.*). Based on the same errors, it was concluded that he had not visited the places he describes and had not seen the objects he mentions. (Reader, pay attention! - we shall now learn on what grounds

Herodotus is absolved of this accusation. - *Auth.*). This was followed by a more thorough study of the text of Herodotus' work itself, the circumstances of its origin, and the identity of the author as it can be imagined on the basis of his work. The result was the complete restoration of the good name of Herodotus as a truthful and conscientious researcher and the recognition of the difficulties he had faced. A methodologically correct principle was adopted to distinguish the materials of Herodotus' sources according to their qualities - poor and good (!? - *Auth.*), biased and unbiased, the manner of their use by the author was investigated in order to clarify the peculiarities of Herodotus' research method" ([44], p. 497).

That is all. This is how one proves the authenticity of the information in a text - one must reread the same text again and "take into account the technical difficulties." Sir John would be very pleased if this technique was applied to his writings.

We can see *that historians want to believe Herodotus*, they approach him a priori as a bona fide and reliable source. On the other hand, we *wish to make a dispassionate examination* as

to what extent Herodotus can be trusted, and whether there are serious arguments for his reliability.

Sources of Herodotus' Information

In this regard, first of all, we should consider the question of Herodotus' sources of information. About Herodotus' reports on Egyptian history, the commentator of Herodotus writes: "Herodotus accompanies the reports on ancient kings of Egypt with references to Egyptian priests and interpreters" ([44], p. 481). "The degree of reliability of Herodotus' work depends entirely on his sources of information. The accounts of Ancient Egypt in the Egyptian Logos are sometimes simply fantastic, but the fault here lies with the informants, the local interpreters and guides, men of little knowledge and no concern for the reliability of what they were telling" ([44], p. 485) "The sources he used (mostly oral accounts by often random people; if he communicated with Egyptian priests they were of the lowest rank only, the least informed ones) were extremely flawed" ([44, p. 496).

One must give credit to the lawyerly swagger of Prof. Boruchovich. But Herodotus himself immediately destroys

the whole construction. He never says that his interlocutor priests are people of "low rank," – this is a conjecture of the historian trying to whitewash Herodotus and cover his contradictions by accusing priests. Moreover, among Herodotus' informants, the Egyptian priests are among the highest in awareness, and, unlike historians, he treats priests with due respect: "...So I believe in priests' tales about Egypt and share their opinion fully" ([44], p. 83).

In general, a legitimate question arises: if we should not trust the information of the priests, then why should we trust the mass of other informants, who are totally "random people"? It is strange that the information obtained by Herodotus from professional experts is considered unreliable by historians, while the anecdotes told to Herodotus by unknown persons are considered trustworthy.

However, we quite agree with professor Boruchovich on the unreliability of Herodotus' sources, we just do not understand why the blame for this should be removed from Herodotus. After all, Herodotus himself prefers not to name his informants. He typically limits himself to anonymous references such as "the Corinthians say," "the Athenians say,"

"the Arcadians tell this story," etc. Historians merely hypothesize about the most probable informants of Herodotus, but there are no positive statements about the primary sources of this novelist (see [44], p. 483).

Herodotus' account of Egypt

But, perhaps, despite the unreliability of the sources, Herodotus managed to avoid major errors? Let us look at what Herodotus tells us about Egypt, for example.

After giving a very detailed history of Cheops, Herodotus finishes it as follows: "This Cheops reigned, according to the Egyptians, for 50 years, and after his death, his brother Chephren succeeded to the throne. He did all things analogous to his brother, and also built a pyramid, which, however, does not reach the size of the one of Cheops..." ([44], p. 120). ([44], p. 120).

There is a commentary on this phrase. It turns out that the priests deceived Herodotus, "Cheops (Chufu) reigned for only 24 years. He was succeeded by his brother Dedephreas, after whom the son of Cheops, Chephren, ascended the throne" ([44]. p. 513).

But "minor" errors of this kind (for a quarter of a century!) do not exhaust the "inaccuracies" overflowing Herodotus' work.

"So, the priests went on to tell us, before the time of King Rampsinitus, Egypt had achieved great prosperity under good laws. But his successor Cheops plunged the country into an abyss of trouble. First of all, he ordered to close all the sanctuaries and forbade sacrifices" ([44], p. 119).

Here is a comment on this report of Herodotus: "Herodotus confuses Egypt's chronology: Rampsinit (Ramses II) is the king of dynasty 19 (1345–1200 B.C.), and Cheops is of dynasty 4 (2600–2480 B.C.)" ([44], p. 513).

This means that the priests (not Herodotus) deceived their gullible listener by a thousand and two hundred years! We advise the reader to think a little on this subject - what a mistake of a thousand years means for a coherent story.

This is what turns out to be called "some inaccuracies" in the books of Herodotus. And these errors, we repeat, *occur in a successive, coherent, and detailed account!*

But a leap of a thousand years is still nothing:

"In order to surpass the former Egyptian kings, Asikhis erected a pyramid of clay bricks to commemorate himself... This is what this king accomplished. After him, the priests said, a blind man from the city of Anicis reigned, also named Anicis..." ([44], p. 123).

We read the comment: "Here Herodotus makes a jump from the end of dynasty 4 (c. 2480 B.C.) to the beginning of Ethiopian dominion in Egypt (c. 715 B.C.)" ([44], p. 514).

This means that the priests deceived Herodotus again, by a thousand and eight hundred years. It is the same as if any [English] historian, giving a detailed account of the history of the [English] state and reproducing the legends from the history of [Celts] in the I century A.D., would immediately proceed to the history of [Queen Victoria].

Despite the millennia-long leaps in Herodotus' chronology, historians built their chronological grid mostly according to Herodotus. In particular, it was from him that they first learned of the monstrous length of Egyptian history:

"They explained that from the time of the first Egyptian king to the last priest of Hephaistus, there were 341 generations of people, and during that time there were as many high priests and kings. But 300 generations is 10,000 years, counting three generations per century. And on top of 300 another 41 generations gives 1340 years. Thus, according to the priests, for 11340 years mortal men only, not gods in human form, reigned in Egypt..." ([44], p. 124).

Naturally, critically-minded specialists perceived Herodotus' chronological information as extremely distrustful. For instance, professor Mooke put forward the hypothesis that the period of the reign of each priest was in fact much shorter than Herodotus thought: not 3 generations per century, but 4 or 5 (20–25 years of reign on average for each priest). This gives, of course, a lesser number, 7 - 8 thousand years. Some other specialists reduced the average duration of the reign of a priest even more (taking 17 years

for example), which further compressed the duration of the chain of Egyptian dynasties. But none of the researchers asked the natural question: how is one ensured that the named priests all ruled successively one after another? It is possible that this whole long list actually consists of several smaller lists describing dynasties, which ruled in parallel or lists simply called the same dynasty by various nicknames. The priests may not have deceived Herodotus - they gave him the total number of rulers, without going into detail as to which of them ruled successively and which in parallel.

As for the "minor" errors in chronology - by 30–40 years - they cover Herodotus' work like a thick layer:

"Pittacus could not meet Croesus in 560 (by the way, there is no such date in the text of Herodotus. - *Auth.*), as he died in 570 B.C." ([44], p. 502),

"...This is Herodotus' error, for Solon's journey falls to the years 594–584. Croesus reigned from 560 B.C. Therefore, Solon could not have met Croesus. Solon's visit to Amasis (Egypt. Ab-mose), who reigned from 569 to 526, also contradicts the chronology" ([44], p. 502).

"The chronology of Herodotus' sources is unreliable here. These events must have belonged to as late as 490 B.C. - The year of the Battle of Marathon" ([44], p. 529).

We are assured that the building of the history is slender and consistent. But how so? The whole page of Herodotus is devoted to the detailed description of the relations of Croesus and Solon (see [44], p. 19), and we are told, that "Solon could not meet Croesus." Could it be that Herodotus is right and the traditional chronological grid is wrong?

Herodotus is not only confused about chronology. It turns out that the priests, Herodotus' informants, did not know their own kings:

"Menes was followed by 320 other kings, whose names the priests listed to me from their book. For so many human generations, among these kings were Ethiopians and one Egyptian woman. All the others were men and Egyptians. And this queen's name, like that of Babylon, was Nitokris" ([44], p. 109).

Here is a comment: "The information in Herodotus about Egyptian pharaohs before the epoch of Ethiopian kings (715–663 B.C.) originates from two different legends (how is it

known? - *Auth.*). From the first legend come the stories of Nitokris (6th dynasty), the 12th dynasty kings Sesostris III, and Moris (Amenemhat III). The second legend is the source of folk tales (? - *Auth.*) about Rampsinite (Ramses III) and the dynasty IV kings Cheops, Chephren, and Mikerin. Herodotus' chronology of kings does not correspond to the royal chronology in the fragments of the Manephon's royal lists" ([44], page 512).

"Thus Sesostris traversed the continent until he crossed from Asia into Europe and conquered the Scythians and Thracians" ([44], p. 110). We read a comment: "Herodotus confuses King Sesostris with King Psammetichus I..." ([44], p. 512). Not only did Herodotus receive false information from the priests (let us add: false, according to traditional historians), but he also conveyed those events, which he saw with his own eyes, with gross errors:

"But there are two kinds of writing used by the Egyptians: one is called sacred (hieratic) and the other is called demotic (national)" ([44], p. 91).

But historians know better which script was used at the time of Herodotus. (It is unclear though, where they got this

information from.) We read the commentary: "Herodotus is inaccurate here. In his time widespread among Egyptians was the most ancient hieroglyphic writing (for inscriptions), hieroglyphic simplified writing, hieratic italic writing (for business papers and letters) (by the way, there isn't any "paper" yet. - Author) and, finally, demotic writing (for wide usage)" ([44], p. 510). Does this mean that, according to historians, Herodotus never saw inscriptions made in hieroglyphics!?

Nor does Herodotus know geography:

"One of the most serious mistakes Herodotus may have made was to speak out the assumption that the Nile flows in the same direction as the Ister (Danube): The Danube crosses Europe from west to east, and the Nile flows parallel to the Ister (P 33: "I assume that the Nile has the same current as of the Ister") ([44], p. 492).

"The figures quoted by Herodotus do not agree at all with the data on the size of the Black Sea known from ancient geographies" ([44], p. 521).

Man, one must have really strong faith in Herodotus to not doubt him even after that! Perhaps the clue lies in the fact

that "as Egyptologists have long shown, the writings of Herodotus are the only source for Egypt of the Saisian era, that makes it possible to imagine a coherent history of the country..." ([44], p. 495).

The only source must be valued, and Prof. Boruchovich states: "But for the Saisian era, close in time to Herodotus, his work is a source of paramount importance, and our knowledge of this era in Egyptian history would be much worse without it" ([44], p. 485). Of course! There are no other sources!

Herodotus' account of Persia

Herodotus also tells about Persia. In historians' opinion, it is better on this matter: "The three last books of Herodotus' work, where Xerxes' campaign is spoken about, have the greatest reliability, and it is unanimously noted by all researchers" ([44], pp. 485–486). However, whence Herodotus received information on Persian power - historians have hypotheses only. Moreover, "Herodotus' explanation of three Persian royal names shows that he did not know Iranian languages at all" ([44], p. 531). It has been

suggested that the informer of Herodotus about Persian affairs could be Zopyr (see [44], p. 482). This assumption was enough for B. A. Turaev to write: "Zopyr, having settled in Athens, was sharing information from the legends of his family with Herodotus..." ([32], vol. 2, p. 127).

We see how supposition turned into an assertion. It is interesting that "although Herodotus never mentions the Bechistun inscription and apparently did not even know it, some places of his account are literal translations of the corresponding expressions of this inscription" ([44], p. 482).

"Herodotus greatly exaggerated the size of Babylon. According to the data of excavations, the circumference of the city does not exceed 18 km" ([44], p. 507).

But how could it be? Herodotus describes the huge city in great detail, concluding his account thus: "Babylon was not only a very large city but also the most beautiful of all the cities that I know" ([44], p. 67).

We consider this contradiction between Herodotus and traditional history to be very serious.

According to Herodotus the circumference of Babylon is about 90 km (!). It is, according to him, a grandiose capital. *Either Herodotus never saw what he describes, or he is describing some other city, not the ruins of a not very large settlement in the desert, which archaeologists hastily mistook for Babylon.*

At this point, we will stop with the enumeration of Herodotus' errors, for it is becoming tedious. The reader can lengthen the list himself by looking at the comments in [44], which are overflowing with statements that "here Herodotus made a mistake. . .," "here Herodotus confuses. . .," etc., etc.

Was Herodotus mistaken?

There are too many mistakes in Herodotus! Were Herodotus' anonymous informants only doing their best to deceive him?

Or maybe these are not mistakes? Aren't the historians themselves mistaken? After all, their refutations of Herodotus rest on very, very dubious grounds... Here, for example, Herodotus writes: "So this protracted war continued with varying success, and in the sixth year, during one battle, suddenly the day turned into night. Thales of

Miletus predicted this solar eclipse to the Ionians and even accurately determined in advance the year in which it occurred..." ([44], p. 34), and in the commentary, we read: "This solar eclipse occurred on May 28, 585/4 BC. But Herodotus took another eclipse, namely on September 30, 610, and therefore pushed back the death of Gyges by 25 years and included in the historical facts the meetings of Croesus with Solon, Pittacus, and Alcmaeon (W.W. Struve. Etudes, p. 98). Therefore, the incorrect dating of the events in Asia Minor and Greece in the 7th to 6th centuries B.C. is based not on the subjective religious and moral beliefs of Herodotus, but on the incorrect dating of the solar eclipse predicted by Thales (V.V. Struve. Studies, p. 100)" ([44], p. 504).

Here we are talking about eclipse №2 according to the Ginzel list (see § 5). Let us recall that the problem of the dating of this solar eclipse was the object of a long and fierce discussion (which is not surprising, because Herodotus does not report any astronomical characteristics of the eclipse, and therefore we have not to find the date by the solar eclipse, but on the opposite, we have to pick the eclipse based on the date, that is attractive for the researcher for some reason).

Over a dozen different eclipses over a span of about 70 years were proposed. In particular, the eclipse of 28/V 585/584 BC was proposed by Bozanne, and the eclipse of 30/IV 610 BC - by Baily. Struve's opinion that Herodotus meant the former eclipse, but described the latter, is justified by hypotheses only and spins in a vicious circle.

By the way, Herodotus mentions only three eclipses (№№2, 4, and 5 according to Ginzel's list) and again without any details. Therefore, the use of their mentions for the purpose of dating is impossible, and confident statements such as "It was October 2, 480." ([44], p. 543) are, at best, the product of incomplete thinking.

Thus, suddenly we are close with Prof. Boruchovich in his confidence for Herodotus, but, of course, on an entirely different basis. Generally speaking, we are always *likely to trust coherent and detailed chunks of text* — it is difficult to make them up "out of thin air." But understanding these chunks is a different thing. After all, understanding (interpretation) of a text is a function not only of the text itself but also of the general presetting of the reader (researcher). If we assume that the book of Herodotus is a

medieval work, interpreting (albeit in an incoherent and confused form) some events and people of that era, then the attitude to it will change right away, and former "errors" may turn out to be pure truth.

Apocryphalism of Herodotus

But is there any reason to believe that the book of Herodotus was written in the Middle Ages? It turns out that there are such grounds, and some of them are very serious. Let's start first with the little things.

The identification, made by Herodotus, of the directions of rivers the Nile and the Danube, according to professor Boruchovich, was widespread in medieval Europe until the late 18th century (see [44], p. 493).

Herodotus writes:

"It is ridiculous to see how many people have already drawn maps of the earth, although none of them can even properly explain the outline of the earth. They depict the ocean flowing around the earth, which is round as if drawn with a compass" ([44]. p. 196).

Looking at the commentary, it turns out that there is a word in the original that allows for an equal second translation: "Or: 'As if it had been turned out by a lathe' " ([44], p. 520). How is this to be understood? Were lathes already known in the time of Herodotus?

Even astronomical specialists accept without a shadow of a doubt the message of Herodotus that "Egyptians count 12 months of 30 days and add 5 more days in addition to (this) number (at the end of) each year, and their revolution of seasons (always) falls on the same time" ([44], p. 81), without noticing that it is grossly contradictory: the difference of $\frac{1}{4}$ day quickly accumulates and leads to major drift of the calendar against the climatic periods.

Therefore, if we believe Herodotus that the calendar did not drift, we will have to admit that in the first half of the sentence he omitted the explanation "or 6 days," i.e., that Herodotus' Egyptians used the Julian (!) calendar.

Thucydides is considered a younger contemporary of Herodotus. There is even a fable saying that Herodotus once read his history in public, and Thucydides, who was present, started crying while listening to the reading. Herodotus

allegedly noticed this and said to Thucydides' father, Olorus: "Olorus, your son's nature is thirsty for knowledge" (see [9], introduction).

Herodotus himself mentions the Peloponnesian War only in passing (see [44], p. 439), but even this is enough for us. Since we established in § 2 that Thucydides' "History" describes events of the 12th century, we must attribute Herodotus' descriptions there as well (so, incidentally, the Greco-Persian wars described by Herodotus, we should look for in the 11th-12th centuries; in this connection, note that a common name for the Turks in the Middle Ages was "Persians").

In this connection, several of Herodotus' remarkable ethnographic reports are also noteworthy.

The Crestoneans of Herodotus

Herodotus repeatedly speaks of large human masses called **the crestoneans**, or **the crestones**. Moreover, there is a whole region of **Crestonia**, the city of **Creston**, etc.

"...Xerxes, however, at the head of a land army, set out from Acanthus, choosing the direct route through the interior of the country to Thema. The way was laying through Theonia and Crestonia to the river of Echidor. This river has its source in Crestonia..." ([44], p. 345).

"Of the rivers listed, only the Echidor, flowing out of the land of Crestonia, haven't had enough water..." ([44], p. 345).

"The king of the Bisaltes and land of the Crestoneans, a Thracian, committed a monstrous deed there..." ([44], p. 408).

Examples can be multiplied very long, as mentions of crestones are scattered throughout the entire text of Herodotus.

There are also names derived from the word "cross": "...The area where they are situated is still called Crosseia" ([44], p. 344).

Herodotus treats the Crestoneans as a well-known human mass, tribe, and people, not considering it necessary to go into details of their life, as he does it in relation to remote and unknown tribes. Moreover, in relation to the places of their settlement, the Crestoneans serve as a kind of the point of reference:

"The manners and customs of all are the same, except the Getae, the Traussians, and the tribes living north of the Crestoneans" ([44], p. 239),

"...The tribes living to the north of the Crestoneans have this custom..." ([44], p. 240).

According to Herodotus, the Crestoneans played a great role in the ethnogenesis of the Hellenes:

"In what language did the Pelasgians speak, I cannot say exactly. Judging by the present Pelasgians, living to the north of the Gerasenes in the city of Creston, they were once neighbors of a tribe now called Dorians and lived in the country now called Thessaliotidae... From this we can deduce the conclusion... the Pelasgians spoke a barbarian language. Therefore, if all Pelasgic tribes spoke so, then the Attic people, being Pelasgic in origin, must have also changed their

language when they became part of the Hellenes. For even to this day, the inhabitants of Creston and Placia speak a language different from their neighbors. This proves that they still retain the peculiar features of the language they brought with them after migrating to these lands. As for the Hellenic tribe, it seems to me, that it spoke the same language from the beginning.

Before their union with the Pelasgians, the Hellenes were few in number. From this rather humble beginning they increased numerically and included many tribes, mainly because they were joined by Pelasgians and many other foreign tribes" ([44], p. 27).

So let us keep in mind, that **the Attic people were thus of barbarous origin and originally spoke the language of the Crestones, which came to Greece from somewhere and merged with the Hellenes**, after which "the Attic people were divided and suppressed by internecine strifes" ([441, p. 27).

It is natural to expect that such important people as the Crestoneans would be identified and studied in detail by historians. However, no! Historians remain remarkably silent

about the Crestoneans. Here are all the mentions of the Crestoneans in the commentaries:

1. The tribes of the Thracians, who lived above Crestoneans, lived between the upper reaches of the modern Struma and Vardar" ([44], p. 524).

2. "Creston is a city in Chalkidica, I, 57" ([44] p. 571).

3. "Crestonia, a region in Thrace, VII, 124,127, VITL P6" ([44], p. 571).

4. "Crosseia, a region in Thrace, VII, 123" ([44], p. 571).

Thus, the commentary merely repeats the information of Herodotus without any additions or clarifications.

Moreover, let us look at the most detailed map of the world according to Herodotus, attached to the Berlin edition of Herodotus of 1964 and reproduced (as an insert) in [44]. On this map are marked all, even the small towns and settlements mentioned in the books of Herodotus. But neither the Crestoneians, nor the Crestones, nor the city of Creston, nor the region of Crestonia, nor the region of Crosseia is marked on this map. For some reason, the makers

of the map chose to remain silent about all these tribes and regions!

In light of the close connection between Thucydides and Herodotus, one cannot help suggesting that **Herodotus took the name of Crestones as meaning the crusaders** that invaded Greece in the early 13th century and founded the so-called "Crusader states."

The fact that "crest" is a Slavic word for a cross should not confuse us, since there are quite a few Slavicisms in the Greek language. The word "cross" speaks of an English influence, quite natural from our viewpoint, since the English knights were, as we know, active participants of the Crusades.

Conclusion

Our conclusion about the apocryphal nature of Herodotus is based largely on the astronomically proven apocryphal nature of Thucydides. It is an example of how proving the apocryphal nature of one book entails proving the apocryphal nature of another, related book.

Nevertheless, the text of Herodotus itself has, as we have seen, many "oddities" which cast doubt on its authenticity. Alarming, besides the mention of the "mysterious" crestones, is the abundance of Herodotus' mistakes, i.e., more precisely, his divergences from the orthodox chronological grid. A person can lie for many reasons, but why Herodotus (or his informant priests) had to confuse politically and ideologically neutral chronology - is completely inexplicable within the traditional model.

In Chapter 13, we will justify the new chronology of Egypt, mostly consistent with Herodotus' information.

Conclusion of the chapter

1. The eclipse statistics definitely point to the apocryphal nature of all eclipse descriptions until the 4th century CE, (see § 5 and 6).

2. Difficulties associated with vague descriptions of eclipses in the sources do not usually allow to give an absolutely reliable astronomical dating (see §5).

3. The only exception is Thucydides, whose eclipses allow us to date his work indisputably to a time after the 12th century A.D. (see, §2).

4. With the most natural (and theoretically the only) calendar hypothesis, astronomy unequivocally places the writings of Titus Livy in the Middle Ages (see §4).

5. The same applies to the works of Plutarch and Polybius (eclipse №27 according to Ginzel's list), Obsequens (eclipses №№28 and 29), and Aurelius Victor (eclipse №48), as well as to the speech of Bl. Jerome (eclipse №57), though, naturally, the speech itself is of little interest to us (see § 5).

6. The history of Herodotus is also, by all accounts, a medieval work; however, there are no astronomical clues to this conclusion.

It could be objected against the new dating of Thucydides and Livy that only descriptions of eclipses were inserted later in their texts, and that everything else was pure truth. But we see that this kind of operation was for some reason performed on most ancient compositions, and despite the startling impression that solar eclipses must make on man (especially in antiquity), not a single ancient work describes an eclipse in such detail that it can be reliably dated. Could it be that the authors of supposedly ancient works were purposely so inarticulate in their descriptions of eclipses?

The astronomical method, of course, cannot say anything about the authenticity of the works in which there are no astronomical "clues," however, the whole building of "ancient sources" is so solidly cemented with mutual references and descriptions of the same events that the removal of even one brick entails the inevitable destruction of the entire building.

In conclusion, let us pay attention to the time when the first astronomically reliable chronicles appeared. It is the

middle fourth century. The whole significance of this date in the history of mankind we will only find out gradually, in the course of research. For now, we only ask the reader to keep this date in mind.

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